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The Journal of the Telephone Industry

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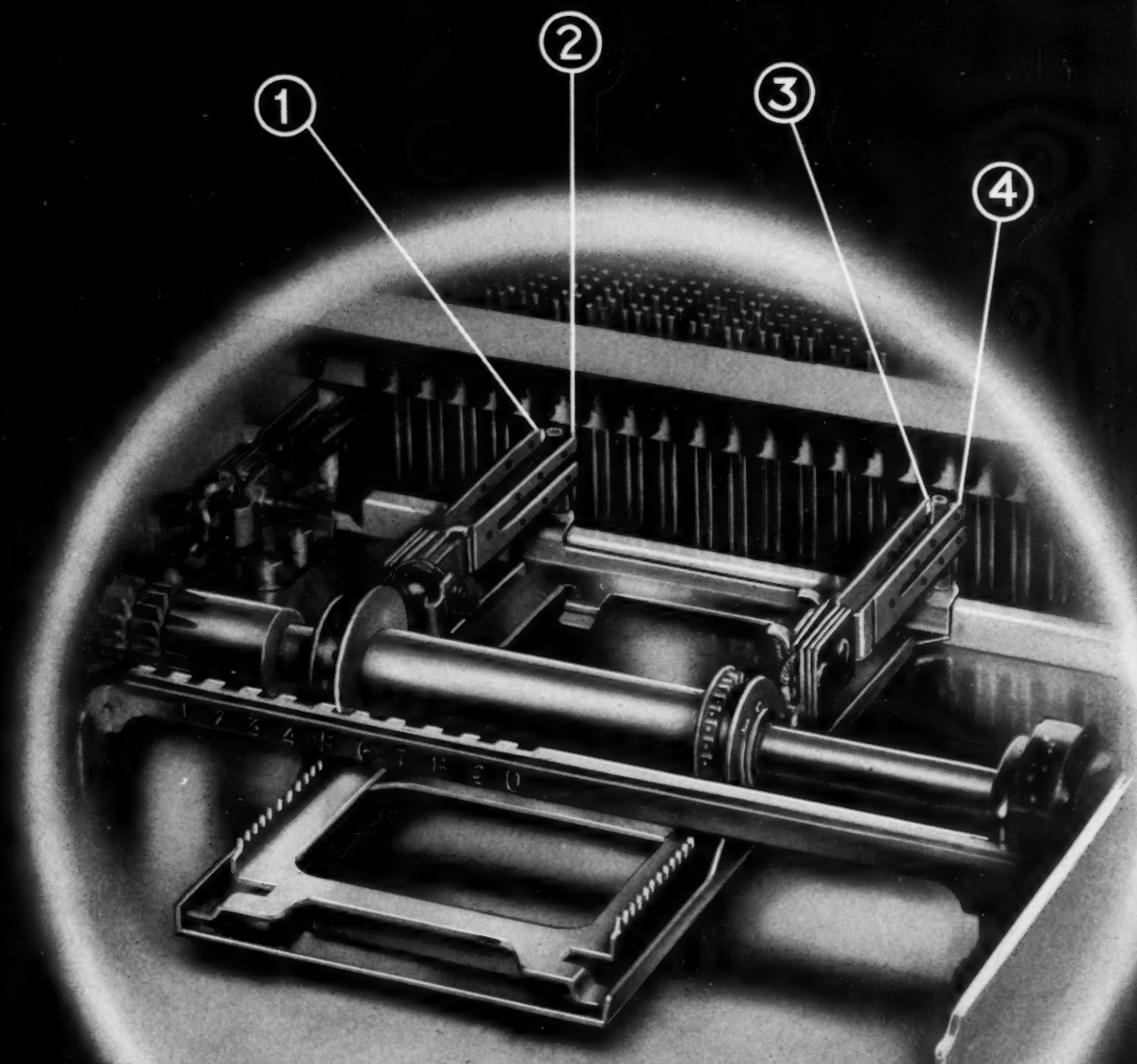
STROMBERG-CAR



Close-up of the XY Switch during the "X" movement. Wires (1) and (2) are Tip and Ring; number (3) is the Sleeve Conductor; and number (4) the famous 4th Wire which solves party-line and dozens of other problems.

TELEPHONES, SWITCHBOARDS • SOUND EQUIPMENT, INDUSTRIAL, INTERCOMMUNICATION SYSTEMS • RADIOS, RADIO-PHONOGRAPHS, FM AND TELEVISION

lecommunications

trowger Automatic Telephone Equipment
ed to provide telephone service in Bristol
roughout the surrounding district has two
of interest. First, it linked subscribers in
gest telephone area in the West of England
h, incidentally was the first in Europe to
C.B. Manual equipment—and second, it
for the first time in Great Britain the
dised single sided rack equipment having
type shelves. Use of these racks enabled
provement to be effected in the cabling,
and trunk grading arrangements, due to
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and line I.D.F. The racks were completely
equipped with Strowger selectors or
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ready for cabling.

ting on the Strowger non-Director five-
ystem, the complete network consists of
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and cut-over in November 1931 with the
six following as the programme of
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subscribers' lines. An auto-manual exchange was
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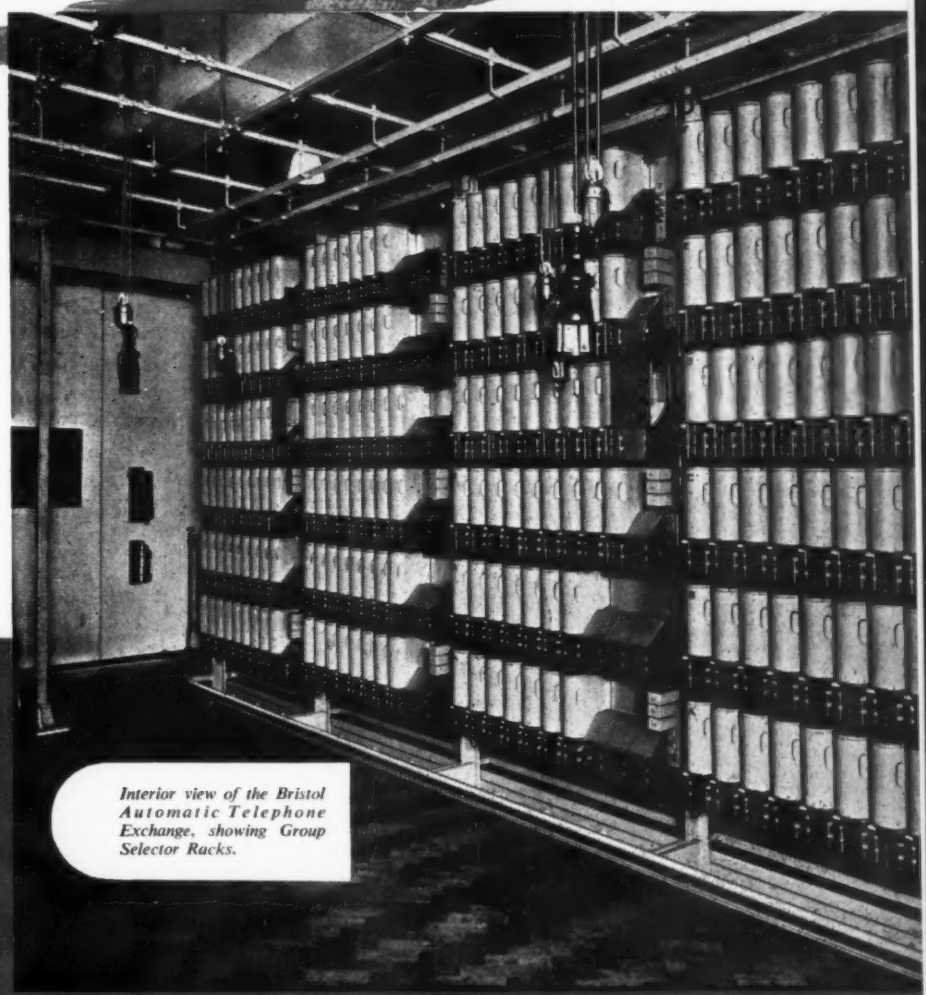
all auto-manual, manual—manual and long distance trunk
traffic and directory enquiries for the area.



Interior view of the Bristol Automatic Telephone Exchange, showing Group Selector Racks.

UTOMATIC TELEPHONE AND ELECTRIC CO. LTD.

ATM
REGD. TRADE MARK

FLASHES AND PLUGS

SOUTH OF THE BORDER. Mexico, the "Land of Romance," has made a concession to amorous users of the telephone, according to the Mexican Tourist Association. Not only are the telephones in bars, stores and offices free but there are no booths to hamper freedom of motion or ardor of expression. However, most places do request that callers confine their conversations to 10 minutes. But one enterprising store has posted this notice over its free telephones:

"Gentlemen and ladies, please not engage this telephone for more than ten minutes. It is left to the discretion of lovers and the stage to which their mutual passion has advanced to decide what is a proper time to continue their gracious conversations."

• • •

CONFOOZIN' BUT AMOOZIN'. In Hollywood, where fame is often measured by the company one keeps, brittle-voiced Sara Berner is holding her own.

Probably best known for her portrayal of Gladys Zybisco, one of the two telephone operators who bedevil Jack Benny, the petite, red-haired Miss Berner has also been heard with Burns and Allen, Eddie Cantor, and Amos 'n' Andy. Her radio appearances total about 2,500.

Her unofficial title, "the most photographed voice in radio," stems from the fact that she has supplied the voice for characters in many movie cartoons, five of which have won Academy Awards.

• • •

SOURCE OF WISDOM. Three members of the Broadway cast of "Allegro" participated in a radio quiz show recently. One of the questions asked was "How long is the Panama Canal?"

While the first two experts were making their estimates, the third one stepped outside, telephoned the Panama Information Bureau, and was told that the canal is 47 miles long. He rushed back to his seat among the experts and answered: "47 miles."

"Wrong," said the quizmaster. "The Information Please Almanac says it's 50 miles long."

• • •

WHEN EAST MEETS WEST. The ways of the East and West blend no more colorfully than in San Francisco, Calif. There, in the center of Chinatown, under the curling roofs of a red-tiled temple, 15,000 to 17,000 telephone calls are handled daily by the 24 Chinese-American operators of the Pacific Telephone & Telegraph Co.

Serving 2,400 Chinese-speaking customers, the operators not only converse in five dialects but also know the telephone directory by memory and usually can inform a caller if a certain subscriber is in town. For whenever one of the "telephone girls" meets a customer she is told whether he expects to be home during the coming week or whether he is planning to move to some other city.

An average of 4,000 visitors a month visit the exchange when the tourist season is in full swing. But tourists or none, it still remains a functional thing. Seems that the typical Chinese housewife thinks nothing of talking for three solid hours on the telephone.

• • •

TELEPHONIC TAUNTS. John Wizard, a British Broadcasting Company engineer, was annoyed when a burglar took an engagement ring and a camera from his home one night.

His wife was flabbergasted, however, when the burglar telephoned her a few hours later to inquire:

"How do you like being burgled?"

Rubbing it in, perhaps?

TELEPHONY
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May 29, 1948

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IN THE NATION'S CAPITAL

BY
FRANCIS X. WELCH
WASHINGTON
EDITOR

CWA signs three-year contracts with Bell System companies. . . . Appointment of Presidential board of inquiry in Long Lines dispute discussed. . . . NLRB decides "appropriate" bargaining unit in Interstate Telephone Co. case.

THERE is hardly a major telephone company official in the United States who could say that the Communications Workers of America (CWA) is any soft snap for management. This independent national union of telephone workers headed by President Joseph A. Beirne of Washington, D. C., has established a reputation for adroit yet aggressive bargaining on behalf of its members which stands second to none in terms of forthright representation for rank and file membership.

There are some connected with telephone management who would say that the CWA is just a bit too adroit and aggressive for their liking. One Bell man from the South summed it up, succinctly, to this writer with the simple remark "Beirne and his boys never left any change on the counter!"

All of which makes the recent action of several CWA unions in signing three-year term contracts all the more remarkable and significant. Just at the time when John L. Lewis was throwing his weight around again, in the hard coal dispute, and when the CIO was talking loudest about the necessity for a third round of pay increases —or else—that was the time CWA picked to put its feet under the table with Bell management, in several important areas, and play an honest game of "showdown."

The truth of the matter seems to be that CWA leadership has taken a long view of the inflation situation and the dangers that might lie in the direction of widespread strikes at this time; strikes which could only serve to cripple needed production and seriously disrupt the national economy.

CWA has also, apparently, looked out for itself in a particularly intelligent way. Nothing could do the labor union more harm than an epidemic of strikes, particularly utility strikes, at this time. If organized labor hopes to score at the ballot box this year, its chances could be wrecked by a rash of strikes and the resultant anger of the voters. If organized labor ever hopes to ditch or water down the Taft Hartley Act, nothing could freeze that legislation more firmly on the statute books than nation-wide work stoppages.

So, the action of CWA has created the one stabilized area in an otherwise jittery economy. This area of peace could conceivably spread. To the extent that it does spread, and to the extent that labor and management in other industrial lines follow suit—to that extent will the spiral of inflation be brought more nearly under control. It is an elementary fact that neither labor nor management, and certainly not the public, can gain anything from a runaway inflationary game of leap frog, with wages and prices frantically tumbling over one another until they both collapse.

Considering the Bell system as a whole, the current season of contract renewals reveals three separate patterns of settlement: (1) Contracts in those states which do not have special statutes regulating utility labor disputes; (2) contracts in those states which do have special statutes; (3) the controversial Long Lines division's dispute which brought about the sudden and suprising intervention of a presidential board of inquiry named, pursuant to the Taft Hartley Act.

• • •

The District of Columbia is a jurisdiction where there is no special statute on utility labor negotiations. Hence, the recent three-year contract signed here by the CWA and the Chesapeake & Potomac Telephone Co. is worthy of special study because it is probably the pattern to be followed in other similar areas. Last week the Illinois Bell Telephone Co. and a CWA union signed such a contract. A sister Chesapeake & Potomac company signed another such pact in Virginia, and so it goes.

The contract provides for an effective term of three years without any initial wage increases. It also provides, however, for two wage reopening periods. One would come in the first year and one in the second year of the agreement. If no satisfactory wage adjustment can be reached at the first reopening period, the contract could be terminated at the end of one year. If no satisfactory adjustment can be reached at the second reopening period, the contract will be terminated at the end of the second year. But otherwise the contract would run the full three-year term.

Both labor leaders and management, from all areas where these three year term contracts have been adopted or are under discussion, say that this year's negotiation is the cleanest and most earnest of any such conversations since bargaining began between the parties several years ago. Here and there were the inevitable charges, growing out of tense feelings, that one side or the other was not dealing all the cards up, or bargaining in good faith.

But such remarks are almost the accepted incidental music to any real bargaining designed to produce results. As it seems that results are being produced a good deal of high key conversation can be gladly discounted.

It is necessary only to compare the situation with little more than a year ago to realize how much closer CWA and industry management have grown in true understanding of all the problems and responsibility involved.

In New Jersey, the pattern was somewhat different because, as already stated, there is a special law which requires the use of state mediation machinery. Doubtless other states having similar statutes, such as Indiana and Missouri, will follow this New Jersey pattern.

In a word, the New Jersey agree-

ment between the Bell company and traffic workers covered one year. It incorporated a number of provisions of the old contracts but those issues which could not be resolved—principally the question of basic wages—were to be turned over to the state board of arbitration as provided by the statute. Meanwhile, the service continues without interruption.

• • •

Somewhat in contrast with the steady progress made by the settlement of Bell company contract differences with the CWA, was the recent flare-up of White House intervention between the CIO-American Union of Telephone Workers and the AT&T Long Lines Department. By coincidence, the announcement that President Truman had named a special board of inquiry came within a few hours after CWA and the Chesapeake & Potomac Co. had signed on the dotted line for the District of Columbia contract.

What made this executive order so surprising was the fact that neither the CIO union nor the AT&T had broken off negotiations. True, there had been a considerable amount of undercover pushing and pulling to move the theater of negotiations from New York City to Washington, D. C., where the Federal Mediation and Conciliation Service could work on it in more concentrated fashion. Doubtless, the Federal Mediation and Conciliation Service had a good deal to do with the President's decision to set up a special board under that statute which he has always professed to deplore—the Taft Hartley Act.

This is the section of law which authorizes the President to act to prevent any dispute affecting the "national health and safety" of the nation. Whether a strike by the CIO union could possibly have any such dire results is at least debatable. AT&T Vice President Bartlett T. Miller, expressing surprise over the President's action, pointed out that the employes affected in this dispute comprised less than 5 per cent of the total workers in the telephone industry. Certainly, the "national health and safety" was in far graver peril last year during the April strike of the old National Federation of Telephone Workers. Then the President did not seem to be too anxious about the situation.

Administration supporters insist, however, that the CIO union negotiations with AT&T were near collapse and would surely have been so if the President had not acted. It must be said that President Truman picked a first rate man to head his special board of inquiry in choosing Dr. Sumner H. Slichter, Harvard University professor and nationally known economist.

Other members of the board, due to report by June 6, include Aaron Horvitz, New York industrial relations expert, and Charles A. Horsky, Washington attorney.

The President's selection of the inquiry board under provisions of the Taft Hartley Act, came a few hours after the American Telephone & Telegraph Co., parent company of the Bell system, had protested against the setting up of the board. The President had announced on May 18 that he planned the move.

In creating the board, the President stated that the bitter dispute between the union and the telephone company imperiled "national health and safety." The company-union contract expired May 8. The day before, on May 7, representatives of the United States Conciliation Service, who for some time had been trying to bring the disputants together, asked both sides to maintain *status quo* conditions for a reasonable period despite the expiration of the contract.

A day-long session was held in New York on May 8, without breaking the deadlock. Whereupon, the Federal conciliators invited the parties to come to Washington for a continuation of the negotiations. The union accepted this proposal, but the company agreed to go to Washington only to present its arguments against the dispute being negotiated in the Capital.

As to continuing negotiations in New York, the union said it was willing only if the company guaranteed the *status quo* on conditions, which the company was not willing to do.

The union is asking a 30 cents an hour wage increase, a shorter work week and larger pensions. Present pay averages about $1.25 an hour.

• • •

Should all production and maintenance employes of a telephone company having a number of scattered plants, bargain horizontally as a class group rather than join with other employes in the same branch offices? The National Labor Relations Board decided this question in the negative when it dismissed a petition by Local Union B-77 of the International Brotherhood of Electrical Workers (AFL) finding "inappropriate" a unit of all production and maintenance employes in all plant department operations of the Interstate Telephone Co., Spokane, Washington. The board stated, in part:

"The employer's branches are scattered over a large and sparsely populated region. The branches are small, some having only two or three plant department employes, and are located at a considerable distance from each other. The interests of these plant department employes are therefore more closely allied with those of employes in other departments at the same branch than with those of other plant department employes at branches located many miles away. . . . The four departments are interdependent and the operations of all four are highly integrated."

Board member Abe Murdock, in a separate dissenting opinion, did not agree with the majority's conclusion that the plant-department unit proposed is inappropriate. He stated, in part:

"The employes in the plant department are a distinct group engaged in physical work that is wholly dissimilar to that of the white collar workers in the traffic, commercial, and accounting departments. There is no interchange of employes between the plant department and the others. The proposed unit is system-wide, including all the workers in this broad class who are in the employer's service. Obviously, the plant department employes have work problems not shared by the other employes, which can be adjusted through collective bargaining; and separate units of plant department workers are not uncommon in the telephone industry. It is no doubt true . . . that the operations of all the four departments are 'highly integrated,' but this observation applies with equal force to any public utility operation, and to many modern manufacturing concerns."

First Woman Nominated To FCC Membership

President Truman sent to the Senate on May 24 the name of the first lady candidate for the FCC — Miss Freda B. Hennock, New York City attorney. Although not previously active at the FCC bar, Miss Hennock, as a member of the well known law firm of Choate, Mitchell and Ely, has handled radio cases. She has the endorsement of New York City democratic leaders, including Mayor O'Dwyer, and is regarded as a leader of the liberal wing of the party in that state. Because of the lateness of the session there is believed to be some doubt whether Senate confirmation can be obtained before adjournment of Congress.

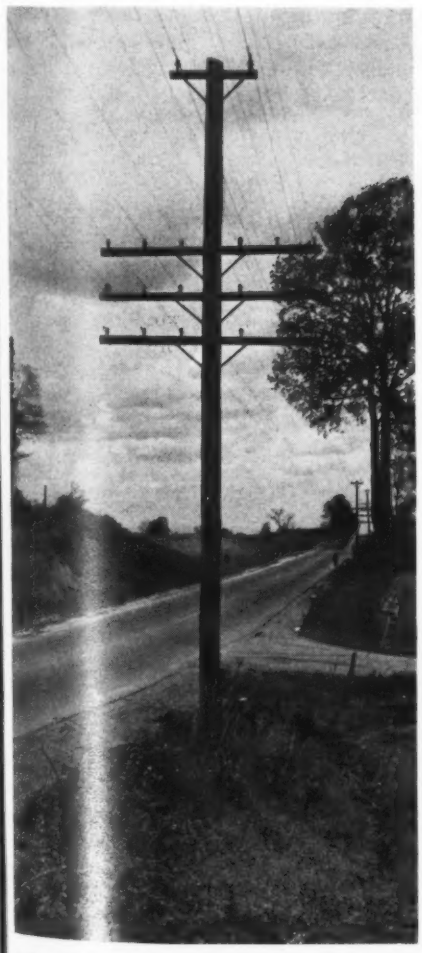
RURAL PLANT Engineering

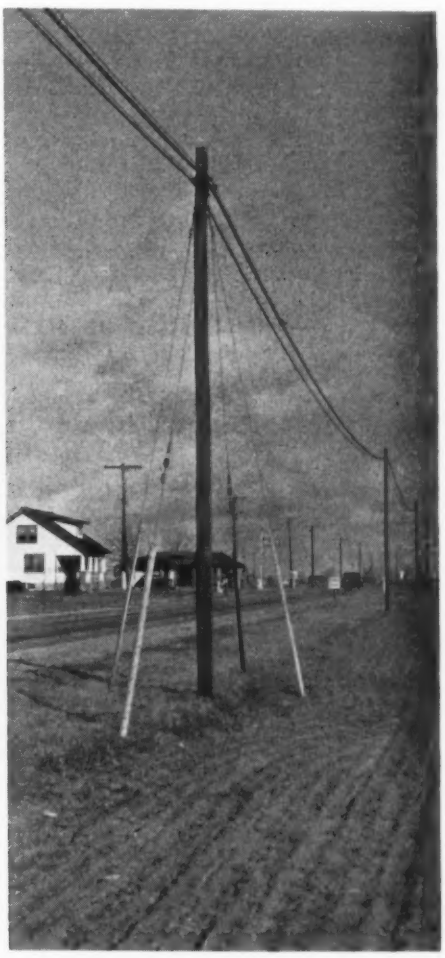
By RAY BLAIN

DURING 1947, the Bell System connected 309,000 new telephones in rural areas, or about 1,000 each working day. The Bell's well-trained army of communications engineers and rural experts have built enough pole line in the past two years to stretch twice around the world. In the same period, over 300,000 miles of wire have been strung. Further expansion of rural plant is planned for the years ahead by Bell and Independent companies alike to bring freedom from isolation of remotely located farms and communities.

The provision of rural telephone facilities calls for careful engineering because it is most essential that the first cost be held to a low figure and that the type of plant provided will have a long service life. At the same time, it should be of a type that can be maintained at a reasonable cost. Good service is a "must" in this day and age and frequent service interruptions cannot be tolerated. It must be admitted that this is a sizeable order, especially when materials and labor costs are on a rapid increase and telephone rates in most localities are still at pre-war levels.

In planning the rural plant, the most minute details of construction costs necessarily must be considered carefully if satisfactory results are to be obtained. Perhaps the first point to be decided is the pole spacing. This factor is controlled, in most cases, by the tensile strength of available line wire. Two types of wire, high tensile strength steel and Copperweld, are generally considered suitable for this type of plant. The No. 12 BWG steel wire has a breaking strength of 1,213 pounds. Copperweld No. 10 AWG, 40 per cent conductivity, has a breaking strength of 1,130 pounds, and the 30 per cent, 1,231 pounds. The transmission characteristics of both wires are very good and have produced satisfac-



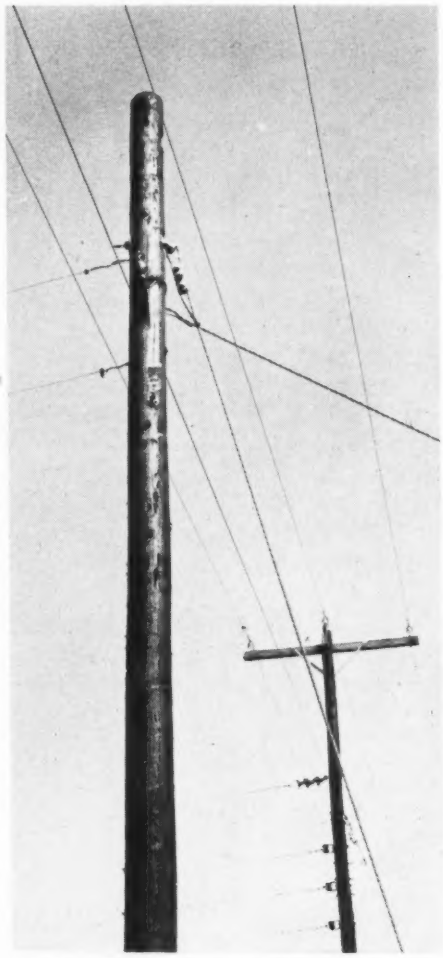


LEFT PHOTO: Example of long span telephone and power lines on common poles. This requires careful engineering. CENTER PHOTO: Cable installed by the spinner method on power line poles. RIGHT PHOTO: Cable leads extending far out into the country to replace open wire.

tory results for rural line use throughout the country.

In areas where heavy sleet and ice loading may be expected, an average span length of 350 ft. is generally recommended. Some spans up to 400 ft. or longer may be tolerated, although curves in highways and the nature of the terrain, etc., will generally reduce the span lengths to an average of between 310 to 320 ft. In light loading areas, span lengths of 450 ft. and longer have been used with success. This plan will in general provide about 17 poles to the mile which is a considerable reduction from the old standard of 35 to 40 poles to the mile, and, likewise, a sizeable reduction in cost.

Good, strong poles properly set are always necessary for long span construction. Most engineers prefer to use at least a Class 10 pole, or equivalent, with a minimum top circumference of 12 ins. for this type of line. Special poles, such as corners, dead ends, or junction poles where extra strength may be required to hold additional strain, should be at least Class 9 pole with a minimum top circumference of 15 ins. Poles should always be of sufficient height to provide adequate clearances only. It is always a waste to use a 25-ft. pole when a 20-ft. will provide adequate clearance. In order to provide the required 18-ft. clearance over highways, use at least a 25-ft. pole. For a 15-ft. clearance over driveways and locations where farm machinery or other vehicular traffic may pass under the line, poles at least 22 ft. long should be used. Where the line is located along a fence row or where either vehicles or pedestrian traffic will not be encountered, poles of sufficient length to support the line wires eight to 10 ft. above the ground level will in most cases prove adequate.



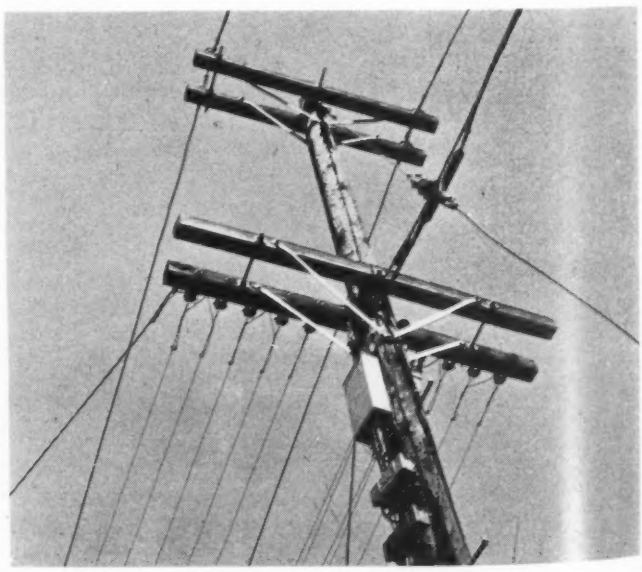
Deadend on long spans calls for strong guying.

The effective strength of good poles will be wasted if they are not properly set. For average soil conditions, 25-ft. poles are set five feet in the ground, and 20-ft. poles are generally set four feet deep. Tamping should in every case be carefully performed so that the back-filled soil will be properly compressed to prevent leaning poles later. Rocks properly placed and tamped in the hole will tend to lock the pole in place and increase its holding power.

Adequate guying is most essential to the success of long span construction since increased strain is imposed on corners and deadends by this type of line. This is due to the fact that high strength wire is pulled to higher tensions and span loads are greater from sleet and ice. In general, one wire on a long span line causes a load equal to about 2½ wires on a lead of conventional span lengths. In other words, this signifies that a long span line of two wires must be guyed as strongly as a short span line of five wires. This also means that all corners, no matter how slight, must be properly and adequately guyed.

Although the guy may be constructed of heavy steel wire, No. 6 or No. 8, 2,200 or 6,000 pound strand is ordinarily considered to be more desirable. Most engineers agree that the more economical method of wrapping the guy around the pole, instead of attaching it with an eye bolt, will prove entirely satisfactory. When the wrap method is used, the guy will stay intact if a lag screw is placed to prevent it from slipping down the pole. The steel wire guy may be served in the anchor rod eye, but guy clamps should be used to make up the strand.

Wood brackets may be utilized successfully in lieu of crossarms to support a two-wire lead. Four wires may be supported on properly spaced wood brackets, but higher poles must be used to provide proper ground clearance which in most cases will equal the cost of crossarms. When wood brackets are used on long span construction, it is



LEFT PHOTO: Approved method of anchoring spinner wire at pole. RIGHT PHOTO: Open wire leaving the cable. Note arrangement of deadending line wire on strain insulators.

generally considered desirable to use reinforcement straps to provide the required additional strength. A special "U" shaped strap which prevents the brackets from working loose under the constant vibration of the higher tensions on the line wire is available for this purpose. Two or four-pin crossarms often are used for long span construction. Crossarms may be used in a conventional manner, but it is always desirable to use a double arm or a backbrace for a deadend. Never deadend long spans on crossarm pins, but on a strain insulator arrangement located in about the center of the crossarm. If deadends are made on pins, the heavy strain usually pulls the crossarm forward or splits it.

Crossarms or brackets and insulators should always be placed on poles before they are set. The line wire may be strung out on the ground and piked in place on the poles with a special wire raising tool. The only climbing required is when the wire is pulled, sagged, deadended and tied-in on the insulators. Line wire always should be pulled to the proper tension as indicated by sag tables furnished by its manufacturer. These tables consider the temperature correction factor which should be observed carefully. Wires are tied in on the insulators in the conventional manner. It always is best, however, to make use of the armored tie for spans of 200 ft. and longer as this is designed to withstand vibration and prevents damage of the line wire at the insulators. This type of tie tends to reinforce and stiffen the line wire in the groove of the insulator and provides for improved distribution of line wire stresses. Moreover, the tie wire acts as an armor over the line wire and protects it against abrasion caused by vibration and swaying.

Good splices are most essential in high tensile strength line wire. The compression type sleeve, especially designed for this purpose, when properly made, proves entirely adequate for this purpose. The use of the compression type deadend sleeve also is recommended.

In order to insure good transmission and reduce inductive interference picked up from nearby electric power circuits, rural telephone lines must be properly transposed. The general transposition scheme will prove satisfactory in most cases. However, special cases require special consideration and treatment. Long span construction does not present any special problems in connection with transpositions except that the supporting brackets should not be located on corner poles.

It is interesting to note that cable is gradually being extended out into the rural sections to replace open wire lines. This especially is true in the more thickly populated sections where the maintenance of heavy open wire leads proves both difficult and expensive. There is every indication that cable construction for rural line use will increase considerably during the next several years and it might be well to start thinking now about this type of plant.

A good rural line. However, it is built too close to a power line. Use of proper transposition scheme reduces power induction to a minimum.

Buried cable often proves an ideal arrangement for, while the first cost for this type of plant is high, maintenance costs over a long period of years prove unusually low for properly constructed plant. In this connection, however, the soil in some sections of the country contains corrosive elements and, in others, gophers attack the lead sheath, causing maintenance difficulties. Where these difficulties are experienced, steel tape armored cable is required to combat gophers and jute covered cable will in most cases provide adequate protection against corrosion.

Buried cable should be so located that it will not be disturbed by future road grading or paving operations. One objection to buried cable for rural line use in certain locations is the difficulty encountered in the crossing of small streams. Generally, it is considered good practice to trench cable under all streams even though it is more expensive than attaching to bridges or culverts. Reduced maintenance costs will justify the more expensive method of construction.

In many other sections of the country aerial cable will prove ideal for serving congested rural areas. Generally, it can be assumed that cable required for this type of plant will weigh approximately one pound per foot. Under average conditions, a Class 7 creosoted pine pole, or equivalent, having a top circumference of 15 ins. will prove suitable for supporting this cable on 300-ft. spans. Spans of this length usually will prove satisfactory, provided the nature of the terrain, drop wire attachments, etc., do not indicate that shorter spans are more desirable.

The supporting messenger for this type of cable should be 10,000 pound strand. This strand should be placed with an initial tension of about 2,100 pounds at 60 degrees F. This tension will be increased to approximately 3,100 pounds at 60 degrees F. when the cable is in place.

Holes should be bored for five-eighth in. suspension bolts and the suspension clamps placed on the road side of all poles. These clamps should be placed on the road side of all poles regardless of the number of times the lead changes sides of the road. This arrangement will facilitate installation as all the cable can be strung from the

(Please turn to page 67)

ABC of the Telephone

By FRANK E. LEE

PART XXXIV. Introduction to Analysis of Relay Circuits. The preceding article in this series appeared in the Apr. 24 issue, page 30.

PRACTICALLY every person who uses a telephone and, perhaps, a good many of the people in the telephone business, gain the benefits of but actually never come in direct contact with, a relay circuit. Nevertheless, everyone of these people, today, are enjoying the advantages of an improved type of telephone service because of the development of relay circuits.

In the earliest days of the telephone all connections were made manually. Ordinary patching cords were used to connect two telephones together at the central office switchboard. A form of relay, an alternating current operated "drop" was installed on the face of the switchboard. When a subscriber wanted the attention of an operator he turned the crank of the hand generator on his telephone. If the "drop" was working right a little shutter on the face of the switchboard fell forward to indicate which subscriber was calling. At the option of an operator, the falling of the shutter would operate a common buzzer to provide an audible signal that a call was waiting on the switchboard.

Next the operator made a connection with the called subscriber. A signal from the hand generator was sent out over the line. If the called subscriber answered he was asked to hold the line and the call was patched through. When the call was completed either or both parties would "ring off" which would operate the switchboard drops, sound the buzzer and the operator would take down the connection.

In the event the called subscriber didn't answer, the operator would inform the calling subscriber that no one answered on a particular line. Many arguments arose between subscriber and operator because the subscriber had no way of telling whether or not the operator actually had tried to make the connection.

Telephone people today may look back and say "Things were crude in those days." Still, service was good. In fact, according to standards of communication existing at the time, service was excellent. This fact brings up a most important thought—today, telephone service should be compared with the best available at the present time and not with what was considered adequate 20 or 25 years ago.

To present an example of what this thought means, consider the manually operated common battery switchboard in use today. The combination originating and terminating switchboard compares favorably with the original patching cord board.

To originate a call, the subscriber removes the receiver from the switchhook, and a circuit is closed to operate a sensitive relay in the central office. Generally, this relay is known as a "line relay." The operation of the line relay, indicated by (L) in *Fig. 1*, causes a contact to close the circuit of a subscriber line lamp mounted on the switchboard.

The operator inserts a plug in an associated line jack. As the plug enters the jack a third wire "sleeve" circuit is closed which operates a "cut-off" relay. The cut-off relay removes the line relay from the circuit; extinguishes the line lamp; and places supervision of the connection under control of certain relays in the cord circuit. This circuit action has been shown in *Fig. 2*. The action of the supervisory relays control cord lamps which are associated with both the answering and calling cords of the pair.

If the calling subscriber disconnects, the answering cord lamp will light and inform the operator the call has been abandoned. To continue the call on a regular basis, after the number is passed, the operator inserts the calling cord in the jack associated with the called subscriber's line. On certain switchboards ringing current is connected automatically to the calling cords. Other switchboards are arranged to place this function under control of a key or button mounted on the key and cord shelf.

While the called subscriber's line is ringing, the calling subscriber hears an audible ringing signal. Thus, he is assured the connection has been completed. This audible ringing signal actually is a "feedback" of ringing current to the answering cord through a simple condenser circuit network.

When the called subscriber answers, the calling cord lamp is extinguished. The operator leaves the connection up until either or both of the cord lamps light or flash to indicate either that the call is completed or that the attention of the operator is desired. Upon completion of the call, the cords are taken down, all operated relays restored to normal, and the cord circuit is ready for use on another call.

First Requirement of Relay Circuit Analysis

What function is performed by a particular circuit?

The foregoing account of how a call is handled on a combination answering and calling switchboard covered only the high spots of a particular circuit. However, this example illustrates the

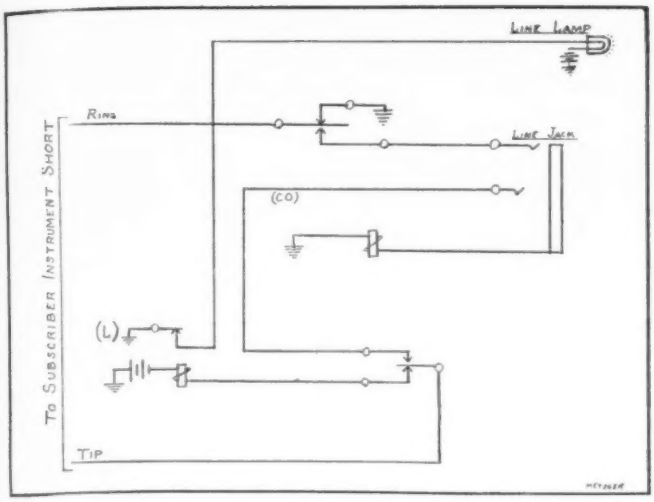


Fig. 1

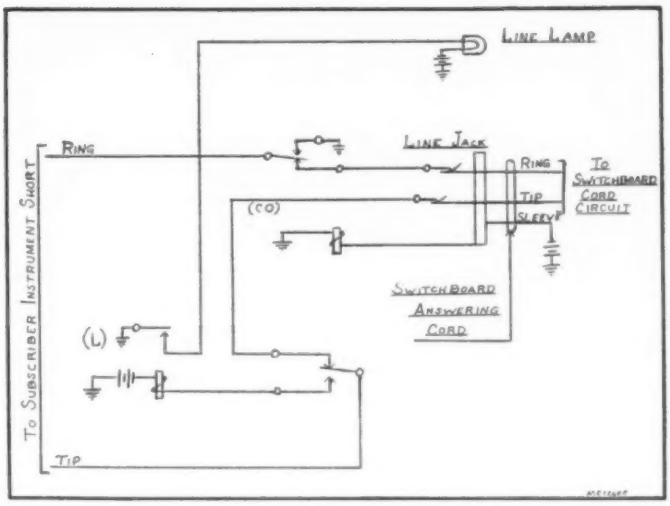


Fig. 2

fact that every relay circuit has a certain job to do. In terms used in the telephone business these are called the functions of a circuit.

Thus, the first requirement of relay circuit analysis is to know the functions of a particular circuit. Knowledge of the functions of a circuit should include:

(1) General knowledge of the circuit as a whole.
(2) Detailed functions of individual parts or components.
(3) How the circuit fits in the broad pattern of providing adequate telephone service.

Generally, manufacturers provide information from which this information can be gathered. Again, as covered in previous installments on fault locating, no attempt should be made to memorize the details of any particular circuit. The advisable method is to place often used information in condensed form, and, when more detailed information is required, know where to locate the desired descriptive material or drawings.

Second Requirement of Relay Circuit Analysis

What is the sequence of operation in a particular circuit?

This is a logical step. First, what is the circuit supposed to do? Now, how does the circuit perform the function? Both of these important steps in relay circuit analysis will be covered more fully through the analysis of certain circuits which will be discussed in subsequent installments. For the present broad, general discussion of the subject, how the circuit operates should answer these questions:

(1) How are the individual relays operated?
(2) What relays must operate or what functions are performed before a particular relay or group of relays is used?
(3) What are the special features of the circuit?
(4) Can the circuit be broken down into separate functional and operational steps?

To determine how the relays are operated requires the use of a schematic drawing plus knowledge of the relays involved. The principle of the operation of relays, special purpose relays, and introductions to various types of switching circuits have been covered in previous articles. All of these articles are available in the popular reprint edition which contains the first 21 installments of this series. (Copies of the reprint may be ordered from **TELEPHONY.**)

The use of schematic drawings in relay circuit analysis is recommended highly because this type of drawing provides a simple means of understanding and visualizing the operation of a circuit. After a little practice on one schematic drawing, practically any drawing can be traced with comparative ease.

General Notes on Relay Circuit Analysis

A few of the more important factors to remember when analyzing a circuit are:

(1) Know the schematic symbols of all of the parts in the circuit. NOTE: Many commonly used circuit symbols are included in Volume I of the reprint edition.

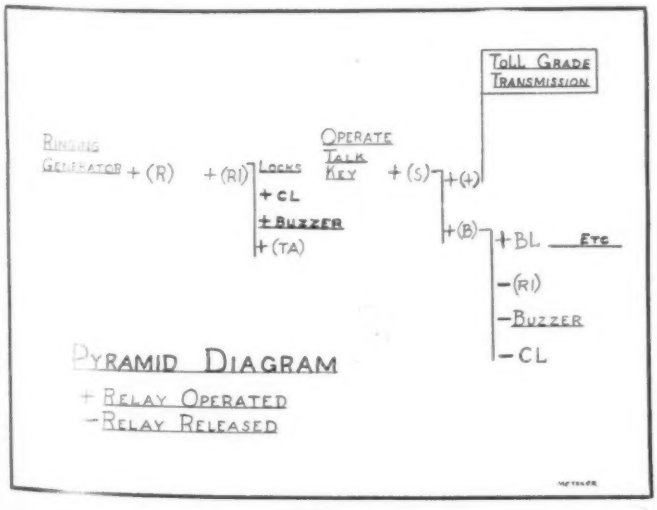


Fig. 3

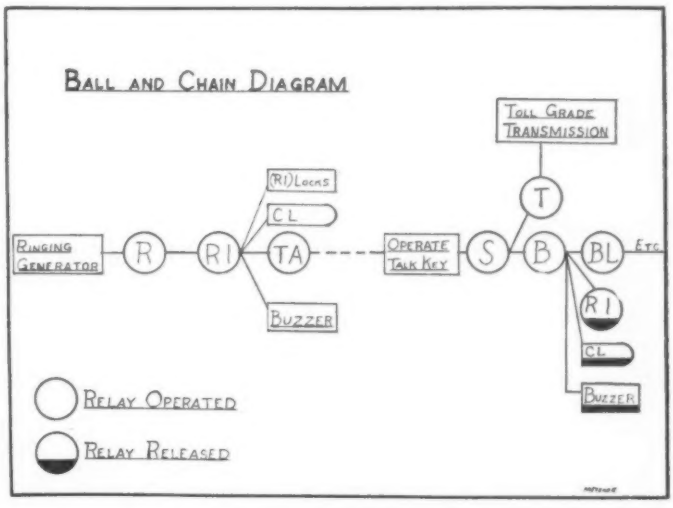


Fig. 4

(2) Know what action or effect is produced by each of the parts.
(3) Be certain a schematic drawing is being studied and not a wiring plan.
(4) Complicated circuits actually are made up of a series or network of simple circuits.
(5) Trace current flow from battery to ground before assuming a relay has operated.
(6) When a ground symbol is shown remember, at that point, the path of least resistance is back to the battery supply.

To save time in locating faults in relay circuits, the repairman should develop some means of recording what relays must operate or what functions must be performed before a particular relay is operated. The advantage of this preliminary groundwork is obvious. A simple chart or a few notes will enable the repairman to start at any point in an operational sequence and quickly locate the condition that caused the circuit failure.

Knowing the special features of any particular circuit may provide a clue or starting point in clearing common cases of trouble. As an example, perhaps in a certain battery charging control circuit the correct operation of a critical polarized relay may be the key to the entire circuit. Unless this relay functions perfectly the circuit may fail. Very often the manner in which this particular polarized relay fails may have a bearing on how the circuit fault is discovered. If the biasing spring is tensioned too much or if the current in the biasing winding is too strong the charging control circuit will not function and the controlled batteries will be over or undercharged. Where a condition of this nature exists, check the critical relay first before any other work is performed on the balance of the control circuit.

The foregoing example, also, will serve to bring out another important point. In relay circuits, correct operation of every relay is critical. The safe practice is to assume that a relay wouldn't function unless its function was required. Therefore any adjustments or tests of relays should be made by using:

(1) Accurately calibrated meters to measure amount of current flowing.
(2) Feeler gauges to check armature travel and contact closure.
(3) Gram gauges to adjust spring tension.

All of these important items will be discussed fully in a coming installment on relay maintenance techniques.

Most circuits can be broken down into separate functional and operational steps. In the original example of the modern manually operated switchboard the various functions could be broken down as follows:

(1) Calling subscriber signals operator.
(2) Operator answers.
(3) Connection to called subscriber.
(4) Ringing called subscriber's bell.
(5) Called subscriber answers.
(6) Called subscriber disconnects.
(7) Calling subscriber disconnects.
(8) Cords removed from jacks.

This listing could be expanded to include many special functions of the cord circuit. However, this will suffice to point out that practically any circuit can be broken down and considered in simple easy-to-understand steps. By so doing the repairman can check the circuit performance function by function.

As a general rule, reports of relay circuit troubles will include an indication of how the circuit failed. Usually, this information will provide the repairman with an important clue as to the source of the trouble.

While on this phase of the subject, a word of caution is advisable. Before making a definite decision as to the general location of the circuit fault ask a few leading questions if the opportunity is presented to talk with someone familiar with the trouble report. If the trouble is in a central office circuit and has been "picked up" by an automatic testing device make a careful analysis of the trouble indication. If necessary, make established routine tests of the particular circuit to determine the nature of the trouble. In some instances the particular relay circuit may "block" in a trouble position, sound an alarm, and require manual release. If this occurs the circuit should be analyzed and the cause of the trouble located.

In some instances the report of a case of relay circuit trouble can be misleading. Early one morning the operator of a PBX board reported "Can't Hear" on the first pair of cords. These cords had been capped to remove them from service until repairs had been made. In a short while the telephone repairman appeared at the subscriber's premises and set about making a routine test and inspection. Among other things, the test included a transmission test with the central office test board.

After finding the cords tested O.K. the repairman started to question the operator of the PBX. In a short while the operator mentioned that the superintendent of this particular plant had told her to have the telephone company fix the pair of cords she had used to complete his usual early morning call to another company plant 30 miles away. Mention of this call gave the repairman another lead. He tested the long line trunk in question and found transmission was below par no matter which pair of cords was used. Consequently, an inspection of this particular long lines relay circuit was made in the central office. A defective contact of the cut through to talk relay was found to be the actual cause of the original trouble report.

Very often relay circuit failures will be caused by dirty contacts. The dirt may take the form of an accumulation of fine dust particles that float in the air, or a minute strand of lint, or a small fragment of cloth switchboard cable, or wire insulation may lodge between a pair of contacts. If the circuit is tested carefully without disturbing relay contacts or wiring, the repairman can make an accurate analysis of the trouble. He will be able to test the trouble to a certain contact or connection and clear it. The results of this type of careful relay circuit fault locating analysis will be the elimination of repeat cases caused by the same trouble condition.

In line with the discussion of fault locating procedure of the subscriber's instrument circuit, which appeared in the Apr. 24 issue of TELEPHONY, the repairman who works with relay circuits should adopt the slogan "Find the trouble—don't lose the case."

Under the heading "General Notes on Circuit Analysis," six important items were listed to help the telephone repairman develop the "knack" of tracing circuits on paper. The first two of these six items have been covered in previous installments of this series. The third item, suggesting that the repairman use a schematic drawing instead of a wiring plan to analyze a circuit, can be qualified by adding these remarks:

(1) A schematic drawing shows how a circuit works by presenting a "scheme" of how the individual parts of the circuit fit in with the circuit as a whole.

(2) A wiring plan shows how the various wires are connected in a circuit. If a thorough circuit analysis and subsequent fault locating tests prove the case is one of wiring trouble, then, the wiring plan provides a means of checking the circuit wiring details. Generally, a wiring plan will show wire colors and other designations which are left off of a standard schematic drawing.

Mentioned earlier in this discussion of relay circuit analysis was the suggestion that the telephone repairman develop a simplified means of recording the sequence of operation of the relays included in a circuit. This information may take any one of several desirable forms, namely:

I. Outline of circuit sequence. The outline method of recording circuit sequence of operations would appear as follows:

(Please turn to page 64)

RURAL LINE TRANSMISSION PROBLEMS

By JOHN GRANT

THE statement is frequently heard these days that the United States is "going suburban." Mr. John Q. Public doesn't object to working in the city, providing he can live and raise his family in the suburbs. This increasing trend toward country living is undoubtedly influenced in no small part by recent improvements in rural communication and transportation facilities. Rural telephones have increased at a tremendous rate during the past few years and present indications are that this type of service will continue to grow for many years to come.

In the past, because of low rate structures, rural line telephone service did not, in all cases, receive the same consideration as did local exchange service and in consequence it was often found to be considerably below average. At that time, also, rural subscribers did not often make frequent toll calls and transmission was usually neglected. Nowadays, however, things are quite different as farmers have begun to realize that they must pay more adequate rates if they are to get better telephone service, and in view of the fact that toll and long-haul trunk calls from rural lines to nearby and even distant cities are common occurrences.

This present practice has made it necessary for operating telephone companies to seek better transmission over existing rural lines and to design new plant with a view to reducing transmission losses to an acceptable minimum, consistent with current rates.

Because of the relatively long length of the average rural line and the widely separated stations served, the provision of the required service does not in every case prove economical for the operating company. In the design of rural plant, it is always a good plan to establish for each exchange area a transmission limit, known as a loop limit, which is employed as a means to cover the maximum losses for any and all lines in the area.

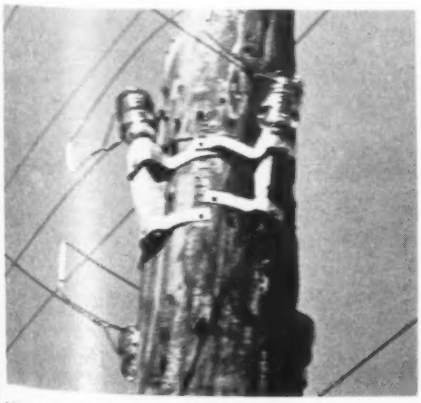
The maximum effective exchange loop loss may be considered the sum of the transmitting and receiving losses in any loop connected to a particular switchboard. This calculation must take into consideration the efficiency of the telephone sets and any noises, crosstalk or distortion which should never exceed the permissible maximum loop loss. In other words, if the maximum loop loss for a certain exchange is to be 10 db, then the sum of the above enumerated losses should not exceed this figure. On this basis, the permissible design of rural lines, using various types of conductors, is indicated in the following table:

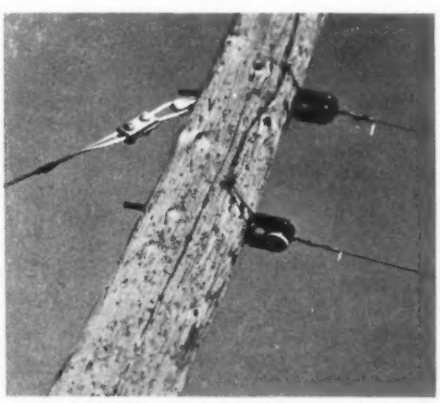
Type of Line	*Permissible Length in Miles*	*db Loss*	*Loop Resistance Ohms*
MAGNETO OFFICE			
22 ga. cable	8.3	4.6	1420
109 BB iron wire	34.0	4.6	2310
109 HTL wire	34.0	4.6	2550
No. 17 buried wire	8.3	4.6	450
COMMON BATTERY OFFICE			
22 ga. cable	6.1	4.0	1040
109 BB iron wire	25.2	2.2	1710
109 HTL wire	25.2	2.2	1890
No. 17 buried wire	6.3	2.5	338

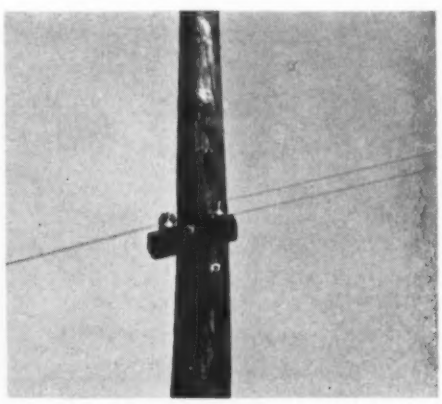
The above table does not include losses due to bridged stations, reflection, excessive noise, crosstalk or distortion.

In common battery exchanges, the signaling limits of a particular switchboard may determine the maximum loop length instead of the transmission limits. The utilization of special long line equipment to extend the signaling limits may be used to advantage in some special cases where only a few lines are involved. When this long line equipment is used, however, the loop signaling limit is often extended well beyond the transmission limits on the average line.

In the design of modern rural plant, three different types of construction are generally employed, i.e., cable,







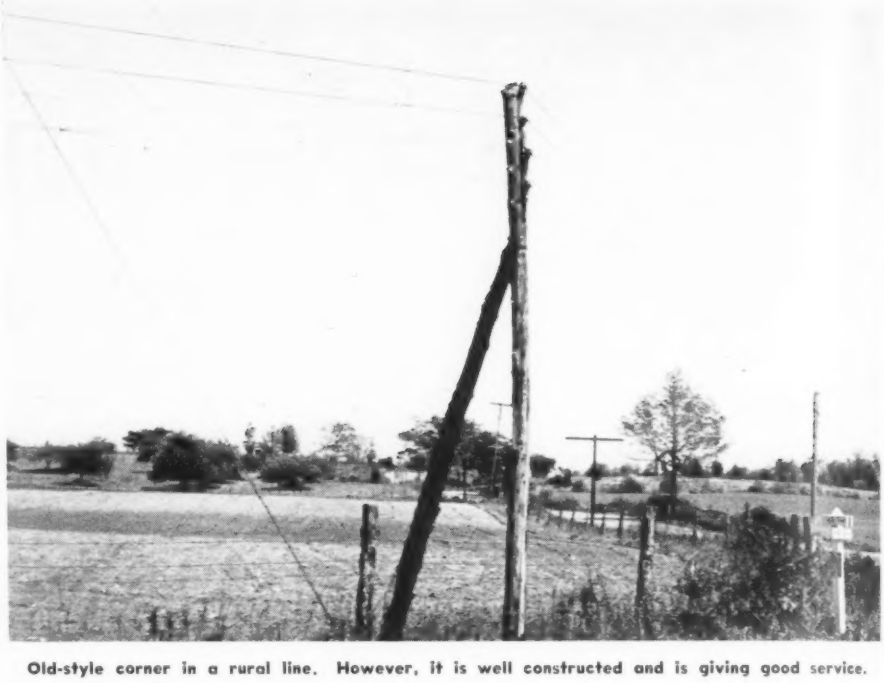
LEFT PHOTO: When wooden brackets are used for deadending long span over open wire, reinforcement cleats like those pictured above are necessary. CENTER PHOTO: One method of deadending long span open wire construction. RIGHT PHOTO: Short crossarm used for making a tandem transposition on a bracket circuit—a new idea which is proving to be successful.

open wire and buried wire. Cable, either aerial or underground, is generally utilized near the exchange. The length of this cable will vary, depending upon the nature of each exchange area. Rural lines often extend to the exchange outskirts in underground cable, then aerial cable through the suburban area where it connects to open wire to carry the circuits over the remainder of the line. In other cases, buried wire may be used for a part of the line.

Cable of 19, 24, or 26-gauge can be used on certain types of rural lines although the 22-gauge is most commonly used for this purpose. On lines where supervision and not transmission limits the length of a rural line, the use of two cable pairs bridged together may be justified in some cases. This practice is not always recommended, however, for with nonloaded pairs it will increase transmission loss and will tend to cause crosstalk.

Generally, steel wire can be used in properly designed rural plants to give good overall transmission. Copper wire, although more expensive than steel, can only be justified in special cases for rural line use. While copper gives much better transmission, its cost is considerably more and must be supported on comparatively short spans.

Copperweld wire also can be used to better advantage on rural line construction, when better transmission is required, than can be obtained with the use of steel wire. Copper-steel wire is available in either 40 per cent or 30 per cent conductivity. These percentages apply to the conductivity of a copper wire of equal diameter. This copper-steel wire has better transmission qualities than steel wire, but is not as good as solid copper wire. It is, nevertheless, a satisfactory compromise for it not only provides good transmission, but also can be suspended on long spans.



Old-style corner in a rural line. However, it is well constructed and is giving good service.

In actual practice, buried wire, while entirely satisfactory from a transmission standpoint, has not proved overly popular for rural line use. It has been found that attacks by termites and rodents have caused serious troubles to buried wire installations. It also has been found that lightning will cause serious damage to buried wire installations if a bare shield wire is not installed with the insulated pair.

At present a new type of buried wire that has a metallic covering is available. It is believed that this shield will not only protect the insulation against attacks by rodents and insects, but will further act as a lightning shield. This type of rural line plant may prove to be more popular in the future.

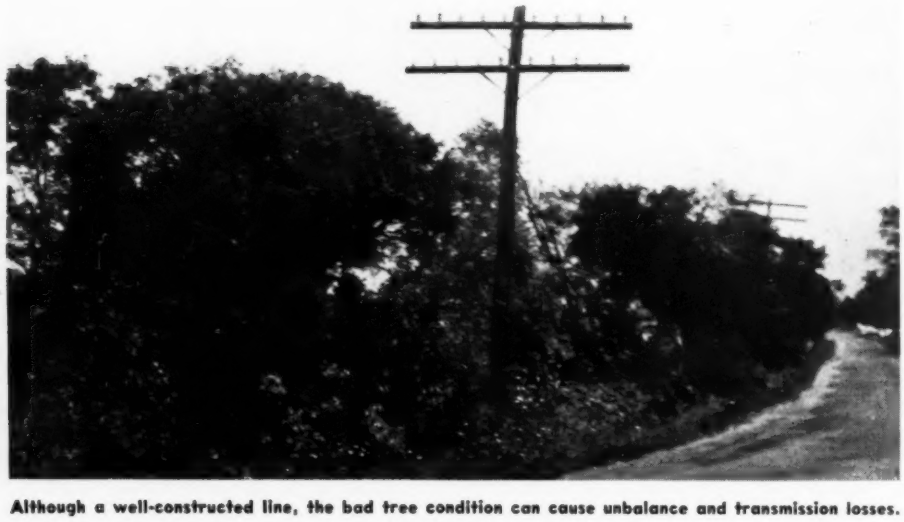
Loading has been used to some extent on buried wire type rural lines. Such a feature has proved successful when coils are uniformly spaced and bridged cable taps are eliminated from the line. This loading will lower the 1000-cycle losses by about 0.6 db per mile.

One of the most serious transmission impairments on multi-party rural lines is the tendency for a third party to listen in on a conversation. Whenever this occurs, a low impedance bridge is placed across the line which, in turn, causes a serious loss in transmission. These losses are more serious on common battery lines than with magneto service. The greater the number of stations listening in on a conversation, the greater will be the transmission losses.

Various means may be utilized to discourage this practice of listening in on others' conversations. Semi-selective, or even full selective, calling systems may be employed. Also, stations may use a simplex arrangement to call the switchboard so that other bells will not ring on all central office calls.

Bridged ringers may cause serious transmission losses when a large number of stations are connected on one rural line. When a high impedance

(Please turn to page 62)



Although a well-constructed line, the bad tree condition can cause unbalance and transmission losses.

MAINTENANCE TESTING EQUIPMENT

By JOHN A. BRACKEN

PART VII. The preceding article in this series was published in the Apr. 17 issue, page 15.

BECAUSE of the effect of the internal resistance of a dry cell test battery upon its terminal voltage the accuracy of the resistance values given in *Table I* of Part VI (TELEPHONY, Apr. 17, p. 15) depends upon maintaining the voltmeter testing battery to within not less than 29.5 volts. That part of the EMF acting across the circuit external to the battery is known as the terminal voltage.

The EMF of a dry cell battery is the total pressure that the battery is able to develop and the current delivered by the battery is regulated by the total resistance of the entire circuit to which it is connected, including the internal resistance of the battery.

In all cases, the terminal voltage, plus the EMF used in overcoming the battery internal resistance, will exactly equal the voltage of the battery. For example, the EMF of the test battery is 30 volts. If the internal resistance of the battery is so high that six volts are used in overcoming the internal resistance when the battery is delivering current to the line circuit being tested, the terminal voltage will be 30—6 = 24 volts, thus being below the minimum allowable voltage of 29.5 volts as stated for *Table I* of Part VI.

Fig. 1 (of this installment) shows a schematic diagram for testing a ground on the tip side of a subscriber's line by means of the testing arrangement shown in *Fig. 1* of Part VI. In testing for the tip ground, the "T, BG, and R" keys are operated. If there is no deflection of the voltmeter needle, the tip is clear; if an indication is observed, the tip conductor is grounded.

In case the test is being made on a magneto party line having telephone ringers operated with ground return, the line conductor should be measured and then compared with the measurement of a similar line in good condition. In this way, the extent of the ground may be determined.

In testing for grounds, it should be remembered that a ground is a convenient term used to show that a part of a telephone circuit is in contact with the earth either intentionally to aid in the proper functioning of the telephone system equipment, or accidentally, thereby resulting in what is called a fault or trouble. The operating current, in either case, flows through the telephone line to the point where it is grounded and thus makes a complete circuit.

Whenever the tip and ring conductors of a line circuit come into contact accidentally, a connection between the tip and ring, called a "short," occurs, and might be either of low or high resistance, so that very little or no current flows through the station telephone set.

Fig. 2 (of this installment) shows a schematic diagram for testing a short circuit using the testing arrangement in *Fig. 1* of Part VI. The "T" key is operated and then the "L" key, the latter to connect the testing equipment directly across the tip and ring of the line; all other keys to be in their normal positions.

If the voltmeter shows no deflection of the needle, the line is entirely free from a short circuit. If a short circuit is present, as indicated on the voltmeter, operate the "V S" key and compare the number of meter scale divisions the needle stands at with the Resistance *Table 1* in Part VI. This will show the extent of the short circuit in ohms.

For example, suppose the needle indicates 7.5 volts. Follow the table column marked "V M" scale, reading down to 7.5, and then to the right straight across under "resistance in ohms with 'V S' key operated," and you will find 588 ohms, which is the loop resistance of the short circuit. A loop is a complete circuit including the return path between two points.

Assuming that the line circuit tested is a toll line to an exchange 10 miles distant and composed of 3,500 ft. of No. 19 gauge cable from the central office to the end cable terminal, and from this point No. 109 BWG-BB iron wire. Assume also that the line is in very good condition and that the fault is what is commonly called a "solid

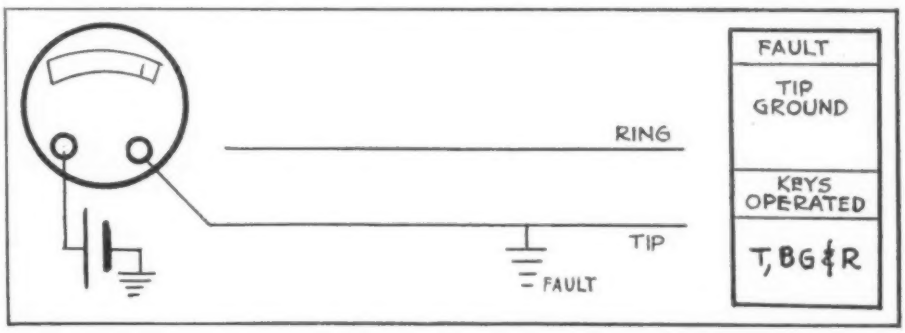


Fig. 1

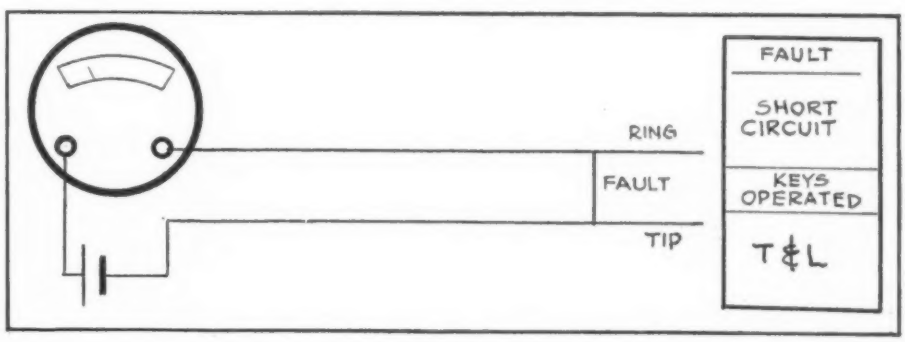


Fig. 2

Hard Drawn Copper Line Wire		
Diameter in mils	N.B.S. gauge	Resistance per mi. at 68° F.
160	8	2.1158
128	10	3.2970
104	12	4.9861
80	14	8.4165
N.B.S. stands for new British standard wire gauge.		

Table 1

Iron and Steel Line Wire				
Diameter in mils	B.W.G. gauge	Resistance per mi. at 68° F.		
		E.B.B. iron	B.B. iron	Steel and high strength steel
165	8	12.42	14.53	17.18
148	9	15.44	18.06	21.35
134	10	18.83	22.04	26.04
109	12	28.46	33.30	39.36
83	14	49.08	57.44	67.88
B.W.G. stands for Birmingham wire gauge, which is an English wire gauge.				

Table 2

Copper Steel Line Wire		
Diameter in mils	N.B.S. gauge	Resistance per mi. at 68° F.
104	12	16.6

Table 3

Annealed Copper Wire	
A.W.G. size	Resistance per 1,000 ft. at 68° F.
14	2.521
16	4.009
17	5.055
18	6.374
19	8.038
20	10.140
22	16.120
24	25.630
26	40.750
28	64.790
A.W.G. stands for American wire gauge. Also called B&S (Brown & Sharpe).	

Table 4

Bronze Wire		
Diameter in mils	A.W.G. size	Resistance per 1,000 ft. at 68° F.
45	17	12.660
40	18	15.963

Table 5

short," that is, of negligible resistance.

The approximate distance to the fault may be calculated as follows: From *Table 4* (of this installment), obtain the resistance of the 3,500 ft. of 19 gauge cable which equals 28.133 + 28.133 = 56.266 ohms; from 588.000 subtract 56.266 which gives 531.734 ohms. This is the resistance of the 109 BB iron wire from the end cable terminal out to the fault, or 531.734/2 = 265.886/33.3 = 7.98 miles to the trouble from the cable terminal, or just about 8.5 miles from the central office. The resistance values shown in *Table 1* and *Table 2* (of this issue) are given at 68 degrees F. For each degree above 68 add 0.002 to the resistance, and for each degree below 68 subtract 0.002 from the resistance.

Example 1. The resistance given for 104 copper at 68 degrees is 4.9861 ohms. At 75 degrees it will be 7 × .002 = .014 + 4.9861 = 4.9875 ohms.

Example 2. For 109 BB iron wire at 68 degrees the resistance is 33.30 ohms. At 32 degrees it will be 36 × .002 = .072, and 33.30—.072 = 33.23 ohms.

NOTE: The purpose of wire size *Tables 1, 2, 3 and 4* is intended to facilitate the making of calculations as the result of voltmeter measurements of line trouble.

(To be continued)

WAITING FOR THE MAIL TO COME IN

The mailman rang the door bell and asked Mrs. Ruth Wierdsman of Milwaukee, Wis., if he could use the telephone.

He swung his bulging mail bag from his shoulder and picked up the receiver.

"Bertha," he asked a moment later, "did we get any mail today?"

CIVILIZATION

When the white men discovered this country, the Indians were running it. There were no taxes. There was no debt. The women did all the work. And the white men thought they could improve on a system like that!—**Industrial News Review.**

CONVERSATIONAL CULLINGS

Conversation is an art in which a man has all mankind for competitors.—Emerson

• • •

Egotists cannot converse, they talk to themselves only.—A. Bronson Alcott

• • •

There is no arena in which vanity displays itself under such a variety of forms as in conversation.—Pascal

• • •

There are three things in speech that ought to be considered before some things are spoken —the manner, the place and the time.—Southey

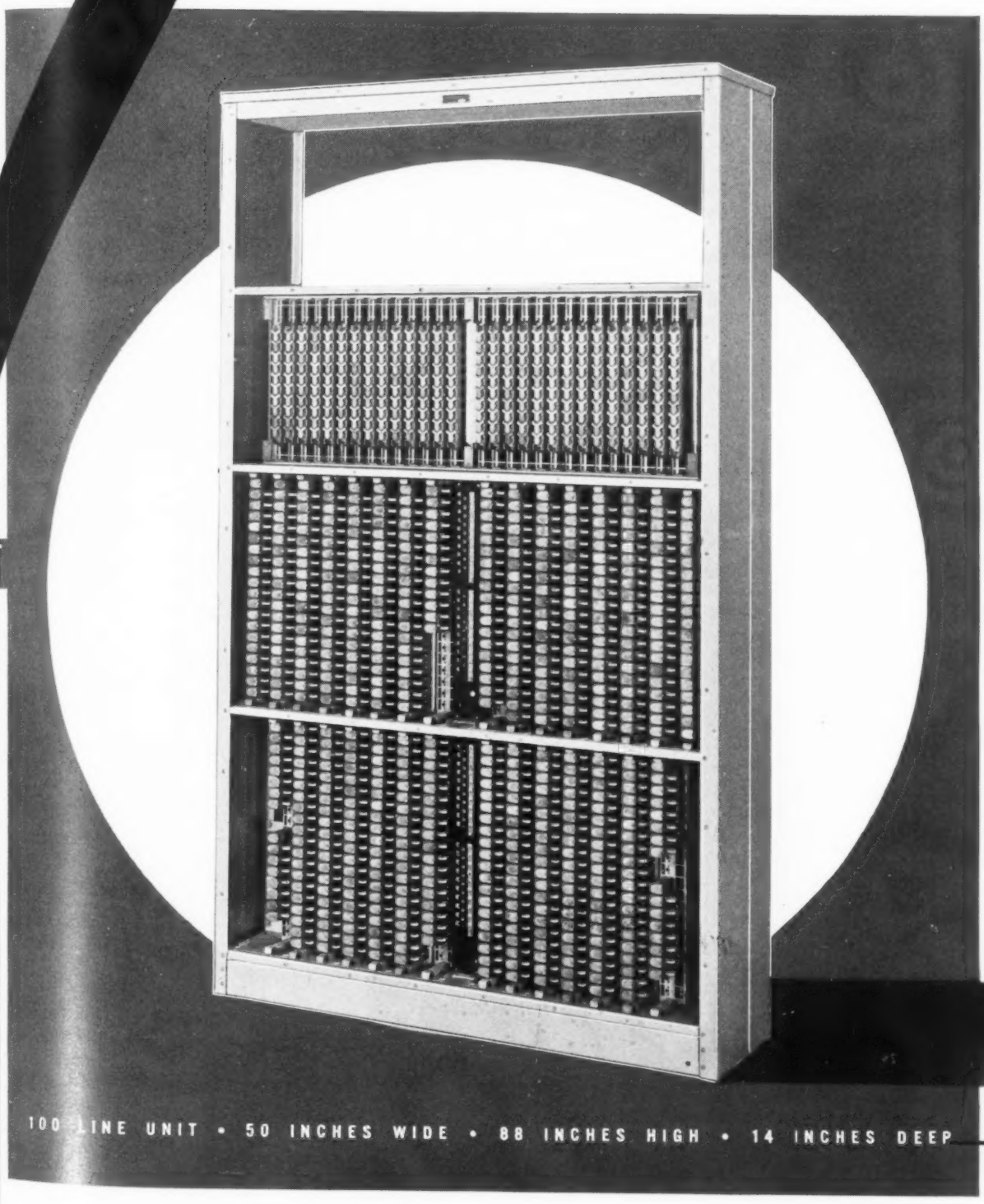
• • •

The great charm of conversation consists less in the display of one's own wit and intelligence than in the power to draw forth the resources of others.—Bruyère

• • •

Never hold any one by the button or the hand in order to be heard out; for if people are unwilling to hear you, you had better hold your tongue than them.—Chesterfield.

better, easier way for the smaller exchange to convert to dial



100 LINE UNIT • 50 INCHES WIDE • 88 INCHES HIGH • 14 INCHES DEEP

THE PLANT MAN'S NOTE BOOK

BY
RAY BLAIN
TECHNICAL
EDITOR

WE HAVE received a report on a most peculiar type of telephone pole, 35 or 40 years old, which remains in service in a line that is operated by the Nolensville Telephone Co., on highway 41A, south of Nashville, Tenn. This pole consists of two 2 in. x 5 in. planks bolted together to form a "T."

It is surprising that such an arrangement would have such a long life.

• • •

This country has 40 million automobile drivers; three and a half times that many pedestrians; and over 34 million automobiles. Add all of these together and you have America's traffic lottery, a complex game of life and death in which each of us must play a hand. Remember, when you gamble in traffic, you bet your life!

• • •

A communications engineer of our acquaintance predicts that within a year machines which give the correct time automatically over the telephone will be installed extensively in the larger cities in the United States. We do not doubt that this will take place, and certainly such a service will pay dividends as well as promote goodwill for the telephone company.

In this connection, the weather reporting service in Washington, D. C., is used extensively and pleases all callers. Numerous people call this service in the morning before starting to work in order to determine whether or not they should carry a rain coat or umbrella.

• • •

It has been said that Americans pay more for government than for food. A Congo tribe overcame this difficulty by eating the tax collector.

• • •

A new development in utility rain suits recently has been placed on the market and should prove valuable to troublemen and other all-weather outside workers.

These suits are patterned in both one and two-piece styles. They offer protection in snow, rain and sleet as they are absolutely waterproof and windproof. They are of roomy design to be worn over regular clothing with desired freedom of movement and comfort.

The two-piece suits consist of coat, pants and detachable hood. The one-piece suit also is provided with a detachable hood. Both have elastic wrist bands.

• • •

A portable reel, weighing less than 15 pounds, has been designed to save both time and extension cords, when used on portable electrical tools (see cut).

This unit prevents kinks and knots in cords by means of a guide which level-winds the cord as it is rewound on the reel. A heavy base and the low set of the cord guide prevents tipping and a specially-designed, ball-bearing swivel provides automatic alignment of the reel and cord with the operator as the cord is drawn from the reel. A rubber ring on the base prevents slipping and marring floors.

It is necessary only to plug in the reel to have power instantly. Current is transmitted through a heavy, double-constant contact collector ring built into the reel. An adjustable brake and lock provide just the right amount of friction to control the rotation of the reel.

The standard unit takes any length of cord up to 400 ft., depending upon the diameter of the cord.

• • •

According to C. S. Bolen, in *Southern Telephone News*, automatic washers may account for some of the long conversations that plague party-liners. With a Bendix, or other automatic washer, a housewife may wash clothes and talk to her friends on the telephone at the same time.

• • •

Soft music will be coming out of more than 40 loudspeakers at the American Greeting Card Corp. in Cleveland, Ohio, soon. At intervals, the music fades and time signals are given.

This may not sound particularly unusual, but it is, for music and time are only sidelines of a vocal paging system, designed to order by The Ohio Bell Telephone Co. Usually such paging systems are employed to locate people for telephone calls and anything else is secondary. But in this case, the customer asked for the extras, so the telephone company worked it out for them.

There also is an added complication in this super paging system, for this card company has two buildings about two miles apart. The paging system, music and time will cover both.

Since the Ohio Bell Telephone Co. never had had anything like this, a special design was required and a special rate authority set up.

This action confirms the often repeated contention of the writer that telephone companies should constantly strive to handle more border line com-

(Please turn to page 34)

You get a CLEAN treatment with PENTAchlorophenol!

Men who maintain communication and powerlines appreciate working with clean, Pentachlorophenol-treated poles that are easy to handle.

Pentachlorophenol is the scientific wood preservative that gives *measured* positive protection.

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DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND AGRICULTURE

munication business. After all, installations of this nature pertain to communication and no one is better qualified to install and maintain it than the operating telephone company.

• • •

A water cooler of new design, recently announced, should prove popular in operator's rest rooms of telephone exchanges. It not only cools drinking water, but also refrigerates a storage compartment of two cubic feet and freezes three trays of ice cubes.

This machine keeps the thirst of 10 to 15 persons quenched and, at the same time, cools beverages and other perishables for noontime lunches and between meal snacks.

• • •

A new lightweight aluminum gasoline operated motor that weighs only 17 pounds and which develops one horsepower is now available and it should prove useful for operating portable tools out on the line. This motor will operate for seven hours on a gallon of gasoline.

PLANT MAN'S QUIZ

Q. Are there any simple means of locating anchors so that they will hold at the correct angle on the pole?

A. We suggest the use of a "bisector," a simple device, which can be procured from your telephone supply house at a reasonable cost.

This device locates the correct position for an anchor as it automatically bisects the angle and gives the location quickly without special measurements or calculations.

• • •

Q. What type of paint is recommended for use on lead cable sheath to prevent damage from squirrels?

A. We have received several reports to the effect that squirrels have been discouraged from knawing lead cable sheath by painting it with a thick coat of asphalt chromate emulsion. This type paint may be applied to the cable sheath with a brush. Painting of all cable in the vicinity of trees will be necessary.

• • •

Q. How should line wires be tied to the insulators at point type transpositions?

A. The generally accepted practice is to leave the wires untied on this type of transposition except under the following special conditions when horseshoe ties should be used on all insulators. These are guyed poles, railroad crossings, highway and power line crossings or any other location where a falling line wire might prove serious.

• • •

Q. Is the splicing of coaxial cable considered especially difficult for the average cable splicer?

A. While this splicing operation is not considered overly difficult, it does require a special technique and special training. A splicer should not attempt to splice this type of cable unless he has had the benefit of special training.

Special tools, such as insulator extractor, sleeve mandrel, shield cutting pliers and ring crimping pliers, are most necessary for this type of splicing.

• • •

Q. What type of shelter is recommended to cover a manhole in which cable must be spliced during inclement weather?

A. There is a specially designed ground type cable splicer's tent recommended for this purpose which may be procured from your telephone supply house. Many splicers, however, prefer to simply throw a tarpaulin over a square manhole guard to form a shelter. They claim that this arrangement proves more convenient to use than a regular tent. With some types of manhole guards, it is necessary to add one or two crossmembers on the top to prevent the canvas from sagging and accumulating water during heavy rains.

• • •

Q. What are desiccants and how are they used as a cable drying agent?

A. Two different types of desiccants are in general use for cable drying at the present time.

Anhydrous calcium sulphate consists of irregular white granules $\frac{1}{16}$-in. in size and this is furnished in moisture-proof cans containing 50, 200 and 800 grams. Such a type of desiccant will absorb a little over six per cent of its weight of water and still retain zero vapor pressure. This means that if a pound of desiccant were to be sealed in a splice containing an ounce of water, the water would all be absorbed and retained by the chemical.

Silica gel is also extensively used as a desiccant for cable drying. This drying agent is composed of fine particles that have the appearance of white sand.

To use desiccant for cable drying after the conductors have all been spliced through, envelop the entire splice with a muslin covering. The desiccant is poured into this envelope and worked through the ballooned conductors. Make certain that the drying agent is worked well back into the conductors near the sheath butts. The splice is then unwrapped in the usual manner with muslin bandage. If there is a large amount of moisture present in a splice, it may prove desirable to work desiccant through the splice two or possibly three times before wrapping the splice. The insulation of a splice will improve for several days after treating in this manner.

• • •

Q. Please advise the largest size of pipe which can be pushed under paved streets with a conventional type pipe pusher.

A. The 3-in. or 4-in. sizes can generally be handled satisfactorily in average soil conditions, and these prove adequate to handle the largest cable ordinarily required. When pushing a pipe of this size, it is necessary to provide a pilot in the form of a 3-in. to 2-in. reducer, with 2-in. iron pipe plug screwed into the 2-in. opening.

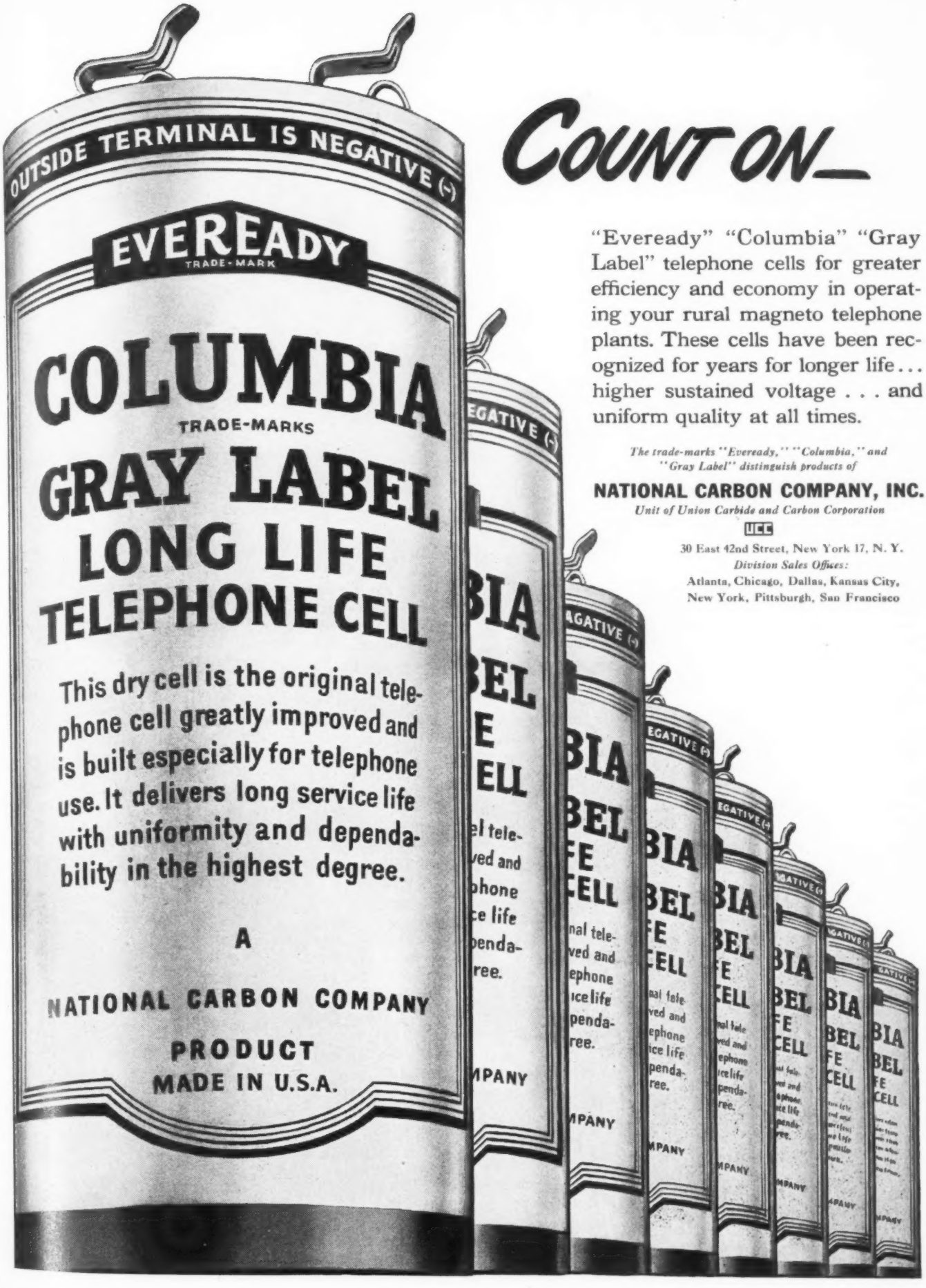
It must be remembered, however, that the action of pipe pushing is one of displacement and compression of the soil by the pilot. Therefore, soils best suited for this operation are clay and loam.

Sand cannot be compressed and the force required to penetrate sandy soils depends upon the percentage of sand found in the soil.

• • •

Q. Will you please explain why so much trouble is experienced on buried lead covered cable when actually lead does not corrode easily?

A. It is true that lead is relatively high in resistance to corrosion by most elements found in the soil. Lead is, however, susceptible to attack by alkaline solutions. This often results in the corrosion of cable sheath at points where stray currents are received from the soil. In other words, corrosion occurs at the point the sheath forms the cathode of an electrolytic cell. At these locations, the passage of current causes electrolytic decomposition and, in turn, deposits of alkaline substances are found near the lead sheath. When the current flow is interrupted, the alkalies are free to attack the lead cable sheath.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FINANCING FOR SMALL *Independent Companies*

By W. R. DAVIS*
Assistant Vice President
Huntington National Bank
Columbus, Ohio

ON SEPT. 20, 1947, D. R. Belcher, treasurer, American Telephone & Telegraph Co., speaking before the annual convention of the Savings Banks' Association of Connecticut, stated that the Bell System was then engaged in the largest program of securing capital funds in its history—possibly the greatest such program in the history of American corporate enterprise. Bell System expenditures for new construction alone, during the next four or five years, will cost over $4 billion, and it has been estimated that this will involve outside financing through the sale of bonds and stocks to the public totaling as much as $2½ billion, and representing about a 40 per cent increase in the outstanding capital of the system.

Mr. Belcher pointed out—very significantly, I think—that if these huge sums of money are to be forthcoming, it is imperative that the earnings of the enterprise be adequate, and that regulatory bodies must approve levels of rates sufficient to pay good wages, provide improving service, and attract the new capital needed for expansion.

The Bell System has not been able to finance growth through reinvestment of retained earnings, but has found it necessary to secure most of the funds to finance expansion through the sale of additional securities. It appears to be the policy of the Bell System to finance plant and facilities through the issuance of about one-third debt securities, and at least two-thirds equity or common stock. Bear these figures in mind; they are very significant.

As you are quite aware, a major portion of the current financing has taken the form of debt securities. Historically, the Bell System has made extensive use of convertible securities as one of the means of bringing new capital into the business, and the treasurer has stated that "A substantial portion of the presently outstanding stock of the American company has been issued through this mechanism." What effect this new financing will have on the enviable dividend record of the company is problematical. AT&T and $9.00 have been almost synonymous terms since the early 1920's.

The problem facing the Independent telephone company today—particularly the small operation—does not differ too greatly, except as to size. The same factors are present with the higher costs of doing business with the current wage scale and taxes being the principal items that are forcing the small operator to think in terms of automatic equipment. Even in our most rural areas, there are new and increasing demands made for additional and improved service. Engineers and technicians are working long hours in laboratories making it easier for people to indulge in their favorite pastime of visiting on the party line. But the cost of new equipment—and possibly a new building—is so high, the management feels in many cases, that it would be better to install a system of Indian drums or buy jeeps and institute a modern "pony express." But the fact remains that if you do not give the kind of service your subscribers want, someone will. No doubt the subscribers will have to pay more for the kind of service they want, but they intend to have it.

All of this is going to cost money—lots of money—and for the small Independent company the problem is acute. One thousand dollars today will not buy much more than a couple of insulators and a cross-arm. So if you have been going along for years, owning and managing your company without borrowed money or outside capital, it appears that tomorrow will bring another worry — that of raising the funds with which to finance your plant restoration and improvement program. At least experts tell us the day is practically here. These funds primarily will have to come from the investing public, since depreciation accruals and retained earnings can provide but a minor part of the requirements. Some companies may be able to arrange term loans to cover a part of their expansion programs. Even for the large companies, this problem is not an easy one in the present market.

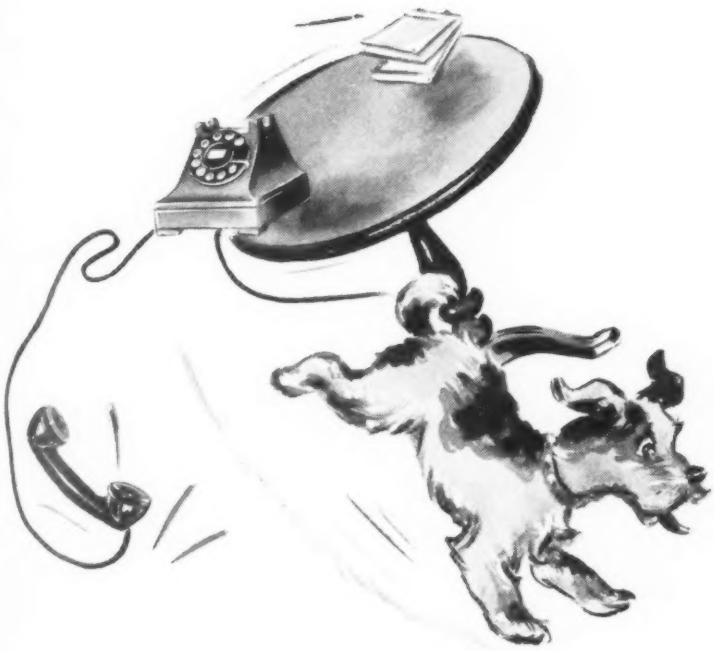
As a class, however, the problem is easier for the larger Independents because they have been more credit conscious than the small company, and they employ trained personnel who think in terms of credit and credit requirements. Therefore, in many cases the small Independent will have to revise and expand his accounting system and start thinking in terms of credit from the standpoint of investor or lender. This matter of adequate records is a most important one and should not be taken lightly. The day of guesswork in business management—large or small—is gone forever. You are entitled to know and you should know at all times just what your margin of profit is. By the same token, if you are considering an investment in a business, you will want to satisfy yourself that it is safe, and will pay you the reasonable return to which you are entitled. You will expect to see the result of operations each year, and if the business is losing money, you can determine the safety of your investment.

So, before investors or lenders can show much interest in your credit problem, there is certain basic information that you should be able to furnish. It may be divided into six main headings, and perhaps supplemented with other pertinent information, depending on the type and amount of capital sought:

(1) *Financial Condition.* Balance sheets and profit and loss statements should be available for the last five or 10 years (depending on the size of the

*Address before the recent convention of the Ohio Independent Telephone Association.

We expected this...

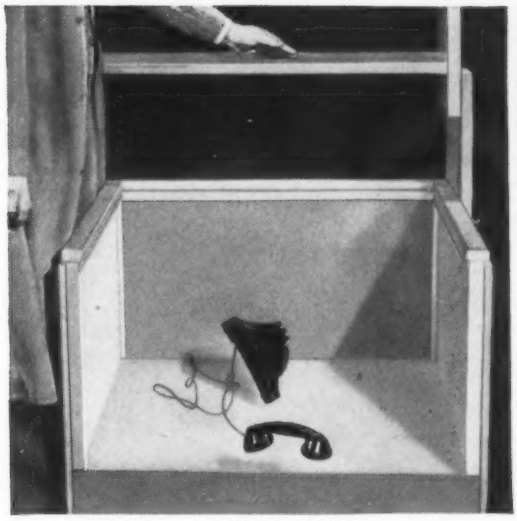


TELEPHONES must withstand continued hard usage. To make sure that they will, Western Electric engineers test each day's production of subscriber sets at the factory to insure that standards of ruggedness are met.

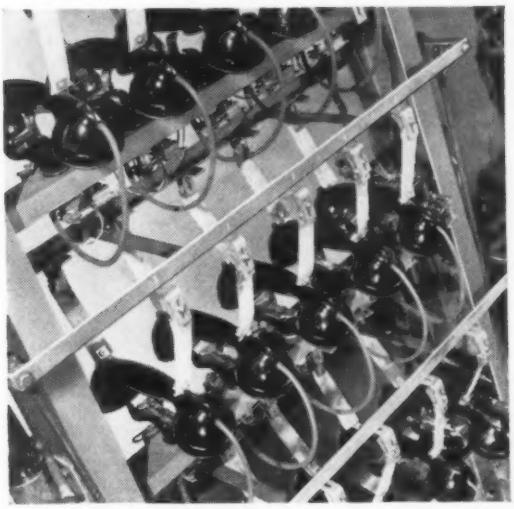
Other subscriber sets, taken from the production lines, are sent to Bell Telephone Laboratories where, in addition to the three tests pictured, handset handles and transmitter and receiver caps are checked for mechanical strength, dials are analyzed to determine noise levels, the pressure required to operate switchhooks is measured, feet of combined sets are checked to make sure they won't scratch or stain subscribers' furniture . . . and many other important details are constantly watched.

Little wonder, then, that Western Electric telephones can take the rough treatment they get in years of service.

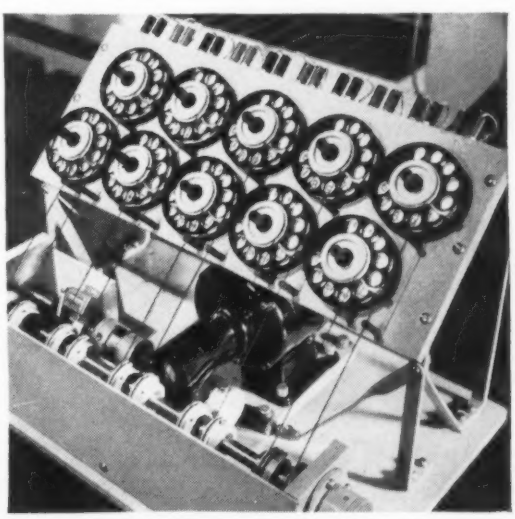
Western Electric
TELEPHONE APPARATUS AND CABLE



In this test, complete combined sets are dropped from a specified height onto a hardwood surface. Each one is dropped from 16 different positions.



These handsets are given a 1½" free drop 22,000 times overnight . . . equal to four years of normal usage. 20,000,000 of these test drops have been made.



Subscriber dials should be capable of at least one-half million operations. With this machine, dial life is checked at the rate of 40,000 dialings per day.

financing), clearly setting out all of the assets and liabilities with a complete breakdown showing what comprises the plant account. Income from the various sources should be segregated as well as the various items of expense, including depreciation allowed, replacements and repairs, taxes, fixed charges, and dividends actually paid.

(2) *Pro Forma Statements.* With vision and foresight, one can project the financial position of a business, taking into consideration the proposed financing and, perhaps, a new rate schedule, as well as certain economies which the new equipment will effect. This will indicate in rather definite terms the type of financing you will need, and it will enhance your position when you approach the public utilities commission to talk rates. You should project your financial position at least one year in advance, and possibly more. It is an index of good management, and means that the company will have a danger signal on lower profits and can act to correct or alleviate the condition.

(3) *Equipment Rates.* You should be able to submit a schedule showing the type of equipment presently in use, and the current exchange rates, as well as the type of new equipment and the proposed new rate schedule.

(4) *Area Served.* A simple statement regarding the general area and a breakdown among business, rural and residential telephones, with the prospects for community growth, would be of definite interest.

(5) *Present Exchange Rates for Neighboring Companies.* The present exchange rates and type of equipment used in contiguous areas should be of especial interest to lenders or investors.

(6) *Management.* This, perhaps, is the most important of all for to some extent, other factors require peering into the future—a never certain process. Management still is one of the greatest protections for future earning power. Confidence in the ability, resourcefulness and integrity of management is essential. Every lender and investor should ask himself if management is experienced to the point of being able to cope with adversity, and if there are others in the organization possessed with executive ability.

Armed with this information, you will be able to obtain good advice as to the type of financing you need, especially if you confer with men experienced in this specialized field. If your problem is one of a purely temporary nature, then your banker is the man to see. If it is a loan of several years' duration, then other institutional lenders are your next and most appropriate source. Bear in mind that the principal of a loan must be repaid with interest, so you can judge for yourself if your past or future earning record will justify this repayment and permit a retention of earnings for future improvements and expansion. For the past few years, interest rates have been low, and this fact alone has prompted many businesses to issue bonds or long term notes. But remember what so many learned the hard way in the 1930's—that large amounts of fixed liabilities can spell disaster in periods of depression and low earnings —when many companies experienced difficulty in meeting interest payments, and found they were too greatly in debt to borrow further; thus were forced to lose their businesses because they could not meet principal maturities.

Earning power, therefore, is of prime importance, and it has been shown that even our largest telephone companies cannot finance plant expansion entirely with debt securities. As I have mentioned, the Bell System tries to finance no more than one-third in this manner. A reduction of expenses, however, through the installation of automatic equipment and the elimination of operators' wages, plus an upward revision in rates, often changes the complexion of long term financing.

If it is equity capital you need, there is but one avenue open for the small company. It is to issue additional common or preferred stock. Common stock is the artery through which the life blood of any business flows. Actually, it is the owner's share of the business, and the general credit standing of your business depends to a great extent on how much you have diluted the value of your common stock by issuing debt securities. When you have fixed charges against income, ahead of common dividends, a reasonable return to the owners is far less certain. If I own a business—or a part of one—I expect a return on my investment, and so do you.

Some utility companies have made their preferred issues more attractive by establishing a sinking fund for retirement. This could involve a nominal payment each year, contingent upon earnings, and be sufficient to support the market for the stock.

This brings up the matter of marketability for your common stock, which probably will have to be sold in your community—perhaps to your present subscribers or stockholders. I talked recently with a man in a small community who stands ready to buy—or sell—the shares of a small telephone company, and this act alone, is the only support the market needs. The stock pays a reasonable dividend, and very little of it changes hands during the course of a year. The price has remained almost constant.

Another means of financing is the plan used so effectively by the Bell System—convertible debentures—convertible into common stock. If a small company were to sell convertible debentures, the expense involved and the difficulty in marketing would make it prohibitive for all practical purposes.

A good small telephone company does not have to stay small. Perhaps two small companies could go together in the interest of obtaining more favorable financing or, perhaps there are adjoining telephone properties that could be acquired, bearing in mind that it is harder to raise a small amount of capital for a small company than a larger amount for a bigger operation. And if it is a loan or debt securities the company is seeking, the size of the loan and the size of the company are of prime consideration. The cost of making a loan is about the same, regardless of the size of the loan. Equity capital—stock—is more salable in a larger operation, and it enjoys a better market. I realize this statement affords little comfort for the small operator, but remember, there is strength in unity and a probable reduction of expenses in a larger operation.

Robert Laffan once said of the small telephone business, "It is one of the biggest little businesses and one of the best entrenched today. It is little because the great majority of the telephone companies outside the Bell System are rural exchanges, with a hundred or so subscribers. It is big because fully two-thirds of the communities of the United States are dependent upon the 6,500 Independent companies, and the 60,000 or so rural lines for service. They operate one-tenth of all the telephones in the world, and they serve more subscribers than the total for Canada, Mexico, Central America, South America, Africa and Asia, combined. It is entrenched because, however small, the little telephone man is free from competition. He has a state franchise . . ."

Yes, the small telephone business has made it possible to connect our most rural areas with almost any other spot in the world. This fact was proved during the war. Your problems are acute, but they do not differ too greatly from those of the millions of other small businesses in our own country.

In times such as these, when the future is clouded with uncertainty, the percentage of debt to equity should be kept as low as possible. Your business can never be bankrupt unless it has debts.

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✓ .. EASY TO CHANGE

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build up your exchange, just slip one or more new units o place. "Jack-in" connections are completed automati-ly, and in only a few moments additional traffic capacity provided.

requirements change later, units can be removed from rvice just as quickly, and transferred to other switch oups (or even to other exchanges!) where additional pacity is needed.

intenance is simplified, too! Strowger "jack-in" units readily be removed from the switchboard and taken to orkbench for inspection or adjustment.

When your equipment is Strowger Automatic, it will be easy and—easy to change—easy to maintain—*throughout a lifetime*. This is a good thing to think of—NOW.

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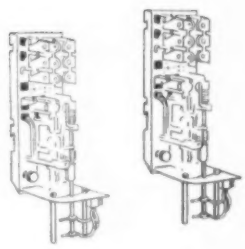
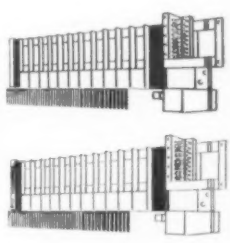
THE 3 basic STROWGER units . . .

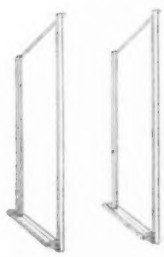
Standard switches, each comprising a complete switch mechanism with associated relays — wired, and with wiring terminated on a mounting "jack" on the base.



Standard shelves to provide mounting facilities and switch "jacks," with all wiring complete to a terminal block at the end of each shelf.



Standard frames—rigid, welded-and-bolted steel structures of standardized design, upon which switches and shelves are easily and securely mounted.



telephony's *SAFETY* bulletins

No. 5—Get behind the Safety Program. What can a small Independent operating company do about initiating and following through on a Safety Program? Read how any operating company can work out a satisfactory answer to this important question.

by FRANK E. LEE

HAVE you ever heard an expression like this—"That's not meant for me—let someone else have the worry?"

To be honest with ourselves sometimes that kind of talk actually means we're dodging an issue. We're forgetting or overlooking part of our everyday job. Something is getting "kicked" around. All too often this type of attitude affects things that really count—like the safety program in the telephone industry.

Some workmen take the attitude that it's the responsibility of the foreman to see that they don't get hurt on the job. Others, and this can include supervisors, too, look at safety as being for the job only. What they do off the job is their own business.

Perhaps a few of the smaller operating telephone companies have a similar attitude that a safety program belongs to the larger companies who employ hundreds or thousands of men and women. The usual qualification for this attitude is—these larger companies can afford the cost of a full-scale safety program.

Now, we have something to talk about. The question is not one that asks —"can a small operating telephone company that employs a few people afford a safety program?"

Instead, the question is —"can this same small Independent company afford to be without a safety program?"

Suppose one of the two experienced linemen employed by a small company should fall from a pole because of a faulty climber and break a leg. Who is going to step in and take his place while that leg is healing in the hospital? In the larger company a man could be taken from another crew and the work carried on with little disruption in operating schedules. Sure, the larger organization would feel the loss of the man. They would miss his personality and ability on the job. They would share the distress, the pain, and suffering that he and his family would have to endure. No matter who was hurt in the larger company the number of people in the organization would permit a shifting of personnel to maintain production schedules.

Would this be possible in your organization?

Safety has no quitting time.

For that matter, what's the difference where the injured man works, or who he works for—he's a human being. He feels pain. His family suffers pain with him. Medical expenses cost money whether a man works for a large statewide operating company, or whether he is one of the two linemen who work for a small Independent serving a small county in the midwest.

If some established means were available to build a record of the number and cost of accidents that occurred in one year—just among the small Independent companies —the total would be amazing.

What can a small Independent operating company do about initiating and following through on a sustained safety program?

With rates and costs figured on such a close margin there isn't room for large expenditures on safety training materials. Nevertheless this type of company knows it can't afford to do without a safety program.

TELEPHONY recognized this need of the small companies all over the country and has set out to do something creative about the problem. Up to the present time, four specific safety bulletins have been published, and this is the second article of a general nature to be presented on the vital subject of safety.

The first article which appeared in the Nov. 29, 1947 issue covered these important aspects of the safety problem:

(1) Definition of a safety program.

(2) Outline of responsibilities of management, supervision, and the individual.

(3) Discussion of the safety conference.

(4) Suggestions on bulletin board treatment.

(5) Clear-cut expression that accidents are caused—they don't "just happen."

After this introduction four direct bulletins followed. First, was a bulletin on the proper use, care, and inspection of step ladders used so often by so many telephone people. This bulletin contained several interesting new ideas on this pertinent subject.

Next was a discussion of poles and how they should be inspected and tested before climbing. From correspondence

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received from a large number of telephone companies, this bulletin already has been used as the basis for many directed safety discussions.

The third bulletin covered the topic "Safety on Stairways." Material in this bulletin fits in anywhere—at work, in the home, or in public buildings. Thus, TELEPHONY's safety program is directed wherever a clear cut safety message will be of the most benefit to all telephone people.

Bulletin number four dealt with the safe use of pliers. Here, again, several new ideas on safety were presented. These items were stressed specifically:

(1) Recommendation for the use of a good pair of pliers designed for the job at hand.

(2) The importance of attaining a safe working position.

(3) Use of natural leverage instead of brute force while doing any job with pliers.

All of these items are important. However, the last one, stressing the advantage of leverage versus brute force, is likely to go the furthest in eliminating accidents caused by improper use of pliers.

How can material of this nature be used by the operating telephone company?

Without question each of these bulletins contains sufficient material to serve as a basis for an informative safety conference. A safety conference of this nature best can be held around a table in a quiet conference room. Where facilities offered by a regulation conference room are not readily available, hold the conference out in the open under the shade of a tree on these warmer spring and early summer days.

If the problem to be discussed pertains to traffic or commercial office activities a suitable time and place for a safety conference can be found right in the central office. The number attending a safety conference is of little importance. However, the smaller the group the more opportunity there will be for everyone to join in the discussion. In a nutshell, the success of any safety program is measured not by the number of people who join in the discussion of safety problems, but by the number of people in an organization who believe in and follow safe working practices on every job.

When you turn away from this page make this silent resolution—"Safety pays. From now on I'm going to join in and support this organized safety program for the telephone industry."

Yes, join in! Join the thousands upon thousands of telephone people who everyday are proving that in the telephone business there is a lot of truth to the slogan "You Have Time For Safety."

Sure! Join in with telephone men and women in every state in the Union. Help make every telephone company a safe place to work.

Remember—on the job, at home, or at play—SAFETY has no quitting time.

Watch for the next TELEPHONY SAFETY BULLETIN.

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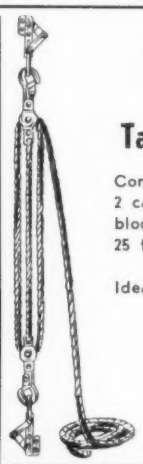

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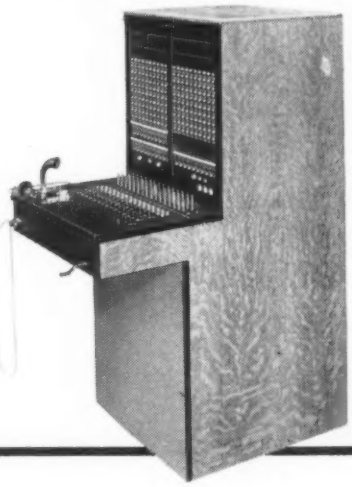

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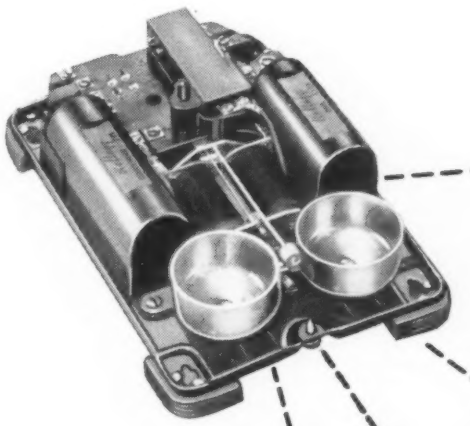

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Subscribers really appreciate the handsome, modern styling and high quality transmission, reception and ringing of Kellogg No. 1000 Series Masterphones. They praise them to their friends and neighbors, too — which wins new subscribers and new revenue for your company! Masterphones hold down your investment in idle equipment, because one base-plate with components takes both wall and desk housings; can be quickly adapted for common battery manual or magneto service. Installation and maintenance are faster and easier, too! All components plug in or screw on, and simple switching units permit quick adaptations for type of service. Sound design assures the utmost in operating dependability. Contact your Kellogg representative for full details *today!*

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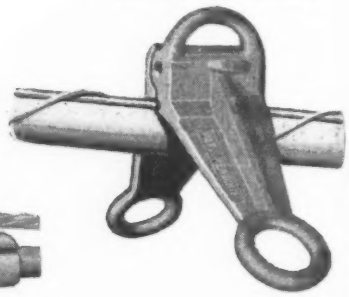

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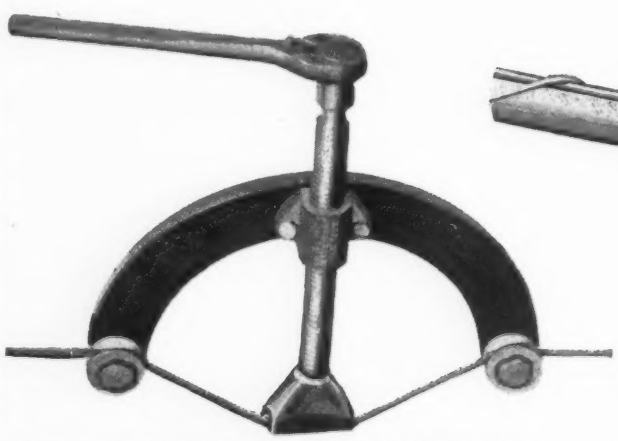

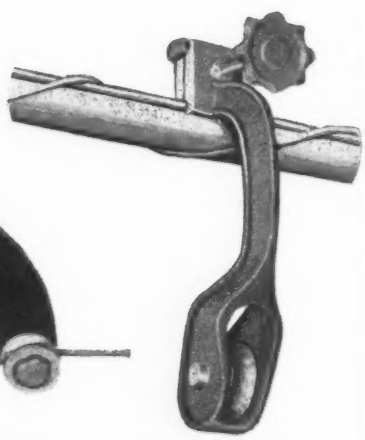

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Mobile Service Inaugurated In Greenwood, S. C.

Officials of the Greenwood (S. C.) Telephone Co. and the Ninety-Six (S. C.) Telephone Co. (the latter is a subsidiary of the Greenwood company) received the plaudits of the public in those towns recently for two major improvements in telephone service made in May.

The first was the cut-over of a dial system in Ninety-Six on May 1, which resulted in giving the entire county of Greenwood full dial automatic service. So popular is the new dial system at Ninety Six, an exchange of approximately 250 stations, that 10,287 calls were placed during the first 24 hours it was in use.

An open house, held in connection with the cutover, was attended by local and state dignitaries and leading Independent telephone men in South Carolina. Several local subscribers who won free long distance calls held conversations with friends and relatives in various points of the country.

Later in the month the Greenwood company inaugurated its new FM mobile telephone system in Greenwood, making that city the fifth in South Carolina having such service. The company had sets in five automobiles for test purposes before the service was offered to the public, at which time between 50 and 60 applications were on file.

The Greenwood Telephone Co. has approximately 3,300 stations and is one of the first companies of its size to offer mobile telephone communications. C. B. Barksdale, president of the company, stated that such installations are in keeping with the company's policy of giving modern service.

V V

Carolina T&T Announces Three Managerial Changes

Three managerial changes were announced recently by the Carolina Telephone & Telegraph Co., Tarboro, N. C.: John F. Holland has become manager at Oxford, succeeding W. G. Patrick who was transferred to the Dunn exchange, and W. W. Aycock was named district manager at Fayetteville.

Mr. Holland, with the company since 1937, has served as central office repairman at Fayetteville, line and station repairman at Tarboro, and manager of the Elizabethtown exchange. Mr. Aycock has been with the company since 1929 and has served as lineman at Rocky Mount, Henderson and Greenville, installer at Greenville and manager of the Rocky Mount exchange.

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Japan's Telephone System

By JOHN D. McMAHON

JAPAN's telephone system does not differ too much from the impression one first receives upon arriving on the shores of this ancient and fabulous land. Most postwar arrivals in Japan who disembark and spend their first days around the heavily damaged Yokohama and Tokyo area are not favorably impressed by the multitude of small, untidy shacks that have sprung up among the ruins and the levelled landscape. In the Japanese telephone system it is also evident that deterioration has taken a toll of what could have been a very adequate utility. There is a total of 7,409 telephone exchanges in Japan of which 124 are automatic, 111 are common battery and 7,174 magneto. At present, 295 of these have occupation force subscribers and 31 are exclusively for occupation force use.

Two types of automatic equipment are commonly used: equipment manufactured by or similar to that of the Automatic Electric Co., and equipment manufactured by or similar to that of Siemans-Halske Co. of Berlin.

Much of the original equipment, now still in use, was gained by Japan in 1923 from German reparations after World War I. Most of the equipment installed in recent years has been manufactured by Japanese concerns, but the parts of this equipment are interchangeable with parts of the two types mentioned above. One exception to this is a 4,300-line office manufactured after the beginning of the war which is a Japanese designed system using, as stated by a representative of the Ministry of Communications, "the best features of both commonly used systems." Not more than a half dozen telephone engineers in Japan are familiar with this new assembly.

J. D. McMAHON

During the war Mr. McMahon served as a Signal Corps officer in the European Theater of Operations, returning to work for the New York Telephone Co. (Long Island Area). In December 1946, he was granted leave of absence and went to the Far East in a civilian capacity as an outside plant engineer for the War Department. For the past year he has served as the technical consultant to the Signal Officer, Eighth U. S. Army.

Local cable distribution systems are based on a "radial" type trunking plan. One office near the center of the metropolitan area is designated as the "Central Office" and this office becomes a combination local exchange and toll office. Trunking routes are then chosen radially from this office extending to points well outside the metropolitan area, in many cases following railroads or main highways. Offices are located along these main trunking routes with few, if any, laterals connecting offices along adjacent radii. Main toll route terminals and equipment are usually located at repeater stations which are in the outer metropolitan area, and toll circuits are connected into the "Central Office" through the exchange trunking plant. On the other hand, there are numerous "short haul" long distance facilities terminated directly in the main toll office.

It might be interesting to note at this time that one of the biggest problems in regard to central office buildings was to teach the Japanese the value of clean buildings. As a general rule, the interior of exchanges are poorly finished, floor covering is in bad shape giving rise to bad dust conditions, there is poor or no lighting and

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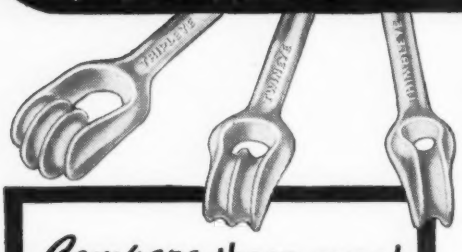
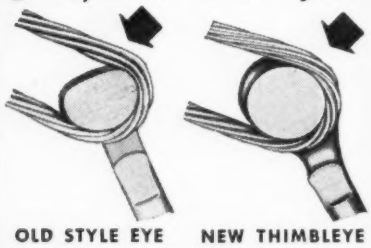


Compare these eyes!



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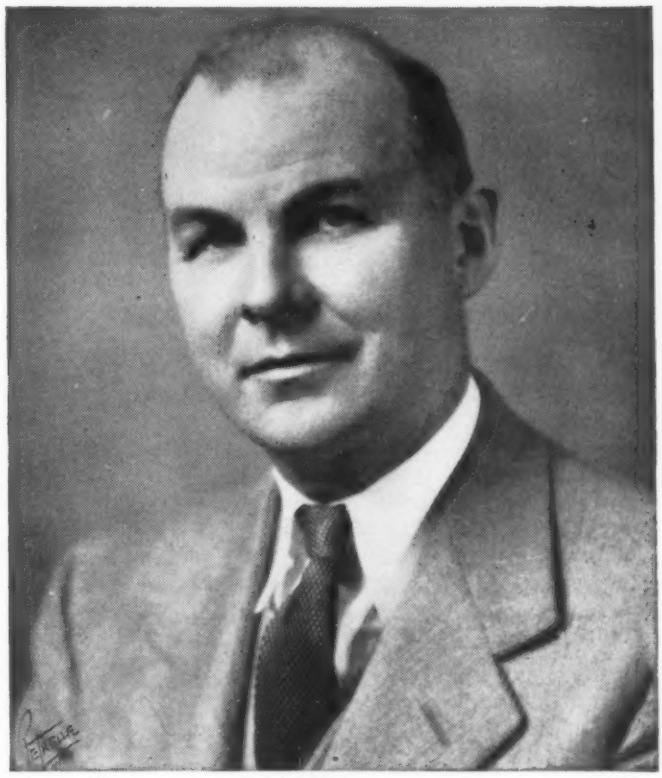

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"In announcing SoundScriber DISCopying* I can assure telephone subscribers that they may enjoy the same advantages of efficiency, dependability and economy in duplicating important telephone conversations that they now derive from SoundScriber recording of routine correspondence . . . *including* original telephone recording."

• • •

*DISCopying — an exclusive SoundScriber feature enabling the user to make duplicate recordings from the originally recorded SoundScriber disc *right on the same instrument* that records your correspondence, with no appreciable loss of clarity.

SOUNDSCRIBER
Trade Mark
ELECTRONIC DICTATING AND RECORDING EQUIPMENT

the buildings are damp and not properly ventilated.

As a whole the poor condition and lack of maintenance of the building interiors is a major contributing factor to the over-all unsatisfactory operation. The general use of open charcoal or wood fires for heating and making tea, combined with the damp interiors, is undoubtedly a basic cause for a large per cent of the contact trouble experienced. The smoke thus produced combines with the atmospheric moisture to produce a gummy, grimy deposit that contains sulphuric acid which causes actual pitting and deterioration of contacts. It likewise causes deterioration of insulation and is an immediate cause of low insulation resistance and a bad state of internal wiring in cases where wiring is not carried in switchboard cables.

Many rooms throughout the offices are used for incidental purposes and storage, apparently without any plan other than to use available space. Repair shops are poorly lighted and equipped. Generally, nothing like fitted work benches, storage racks, shelves or bins are provided. Repaired equipment and that awaiting repair are handled by the pile. Tools are scarce and practically all modern facilities for systematic repair are missing.

There is no record that the Japanese have ever had any regular system of preventive maintenance, and certainly not during recent years. There were certain routine tests made, but apparently they meant little if anything. Equipment was not too badly worn and there were supplies of the most needed maintenance parts. Nevertheless, the rate of troubles per station was extremely high and measured in terms of modern service, the service rendered was inferior.

Due to war damages to housing and other causes, the present number of subscribers being served is a small percentage of previous maximums, and lack of exercise may account for some trouble. However, the trouble rate during the peak of usage was still among the highest in the world. The maximum number of telephones in Japan was in March, 1942, when there was a total of 1,082,447. This was reduced directly after the war to a minimum of 466,217. The total loss of telephones during the war was 616,230, of which 523,230 were due to bombings, etc. and 93,000 which were lost by the Ministry of Communications to the Japanese army and navy.

A visit to the bombed city of Hiroshima revealed that, due to the terrific wind created by the atom bomb, the collapse of buildings and resultant fires, they lost 98 per cent of open wire, 97 per cent of aerial cable and 96 per cent of all the telephone poles. In October, 1941, a typical large city, such as Yokohama, had a population of 954,965 with a total of 15,289 telephones or one telephone for every 62 persons; in October, 1947, the population was 746,605 with a total of 8,631 telephones or one telephone for every 86 persons as compared with a world wide average of one telephone for every 43 persons.

Telephone instruments, like the exchange office equipment, show a very high trouble rate. Switch and dial contact troubles are frequent, transmitters are of a poor quality and receivers have had distortion. Anti-side tone circuits are not used. Probably because of a lack of materials, a very high percentage of switchboard cords are in bad condition with the resultant deficiency in long distance and local service.

To more graphically explain the government's attitude on rendering service to the public, I would like to quote a clipping from the Japan *Times and Advertiser* of 1940:

"Mr. Hideyoshi Kojima, a Diet member from Minseito, voiced dissatisfaction with the slowness of the Communications Ministry in installing new telephones, before the House of Representatives Accounts Committee meeting on Wednesday. He declared that he had been waiting patiently since 1908 for a new telephone after duly filing his application and paying the 15 yen fee. It was claimed that there are approximately 100,000 others in the same boat with him, all waiting, while the 1,500,000 yen paid in (exchange rate from 1910 to 1940 was about four yen to one United States dollar), is not bringing the applicants any interest. Mr. Kenjiro Tamura, Director of the Ministry's Affairs Bureau, apologized and said that the slowness was due to many reasons, 'not the least of which are financial.'"

It was amazing to note in travels throughout the smaller cities and rural farm areas (mostly local battery service), that the subscribers made no complaint even though their telephones had been out of order for years. A check on telephones in the small city banks and business offices revealed that the only cause of trouble had been a loose wire connection on the instrument (possibly due to constant earth tremors), or that the wet cell battery had simply not been cared for. This resulted, of course, in a tremendous increase in the telegraph business, but is an indication that there had previously been no concept of maintenance, or a desire to give service to all subscribers.

The Marunouchi Building in Tokyo

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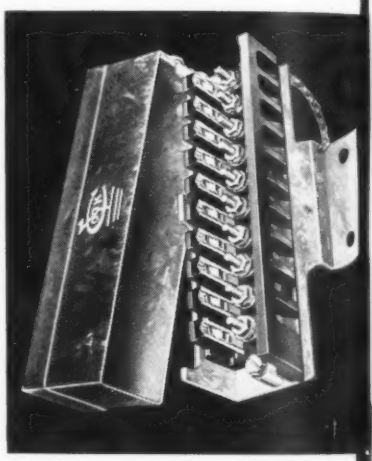

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Highlights of wire communication

"HOSTILITIES WILL CEASE ON THE WHOLE FRONT ON NOVEMBER 11 AT 11 A. M."

DISPATCHED from Marshall Foch's headquarters early on the morning of November 11, 1918, this message marked the end of World War I. Transmitted in both French and English, this telegram brought to a close the greatest war the world had known up to that time.

In peace and war, since the earliest days of wire communication, Hemingray Insulators have contributed to the efficiency of the telegraph and telephone. Experience and research make Hemingray Insulators the finest obtainable today. Manufactured by American Structural Products Company, Subsidiary of Owens-Illinois Glass Company.

Write for the complete historical outline of insulator development.

Hemingray Number 53

Hemingray Insulators have been leaders in the communications field for over eighty years.

HEMINGRAY INSULATORS

American Structural Products Company
MUNCIE, INDIANA
Subsidiary of **Owens-Illinois Glass Company**

contains the world's largest toll switchboard and has a total of about 700 positions. The tiny Japanese girls who serve as operators are one of the most amazing sights in Japan. They all appear to be about 10 or 12 years of age (actual age is about 16 to 20) and they have very musical voices. If you can picture about 500 of these little white-coated, pig-tailed fairies jumping gaily about the room and having a great deal of fun, you have a good idea of a Japanese toll switching center.

As is common throughout Europe, the telephone system of Japan is government-owned. All facilities are operated by a ministry which also renders telegraph, postal and insurance services. The four main islands of Japan (Honshu, Hokkaido, Kyushu and Shikoku) are divided into 10 over-all operating bureaus, each with its own director and staff who are responsible for all of the above functions within their respective bureaus. Officials of the ministry are in unanimous agreement that the entire communications system has greatly benefited from the guidance and assistance given by members of the Occupation Forces; and judging by the zeal which the Japanese people have exhibited in absorbing our beneficial practices and methods, it should not be too long before Japan can actively emulate the Bell System creed, "The most and best possible service. . . ."

Three-Way Call Marks Opening Of Kodiak, Alaska Exchange

A three-way conference call across the North American continent officially opened on May 21 the first public telephone exchange at historic Kodiak Island, Alaska, when connections were made between Kodiak, Chicago and Washington, D. C. Residents of Kodiak, the oldest settlement in Alaska, are now for the first time in telephone communication with the United States and the rest of the world.

Participating in the long-distance and radio-telephone conversation were Gov. Ernest Gruening of Alaska, Mrs. Martha Cushing, owner and manager of the newly completed Kodiak exchange; James H. Kellogg, Chicago, president of the Kellogg Switchboard and Supply Co.; Delegate L. E. Bartlett, Alaska's Representative in Congress, and Col. T. J. Tully, Army Signal Corps officer in charge of Alaskan communications.

The call, over a 4,800-mile circuit, was the longest civilian telephone hook-up ever made across the North American continent.

V V

Geo. Tanner Appointed Manager

George Tanner has been named manager of the Mt. Vernon (Ohio) Telephone Corp., succeeding William D. Giffin who has been manager for the past two years.

THE FACTS OF LIGHTNING

When you see a lightning flash, it is too late to be scared; you never see the bolt that hits you, according to an article in a leading medical journal. As long as you hear the thunder and see the lightning flash, you aren't the one to be struck.

Lightning can strike twice in the same place. Each year about 400 persons in the United States are killed by lightning, but a vastly greater number have encounters with lightning bolts and emerge with minor injuries or none at all.

A burn is the most frequent consequence of being struck by lightning, but it is a different kind of burn, painless and without inflammatory reaction. Usually the struck person falls unconscious, and upon coming to may have a paralysis of the lower trunk and legs which ordinarily disappears within 12 hours. Artificial respiration is called for without delay although the victim may be apparently lifeless and the treatment should be continued up to eight hours or until prior recovery.

Here are a few preventive measures mentioned in the article: During thunderstorms, stay in a house with closed doors and windows, and away from the fireplace. Keep away from the main electric switchbox and meter. A closed automobile gives good protection too; keep the windows up. Avoid lone trees, river banks, hedges, walls, and wire fences. The center of a forest is fairly safe. If you can't find closed shelter in open country, head for a ditch or hollow.

And if you are struck, says the article, it is better to be soaking wet since wet clothing or wet skin may short circuit most of the current.

—Capsules, High Mithoff Pharmacy, Columbus, Ohio.

COURTS and COMMISSIONS

FCC Issues Final Order in Telephone Recorder Case

"Automatic tone warning devices shall be furnished, installed, and maintained by the company or other organization responsible for the furnishing of the telephone service," according to an order issued by the Federal Communications Commission May 21. Thus the commission upheld the previously stated position of the Bell System and the United States Independent Telephone Association on the matter. Effective date of the order is June 30 (TELEPHONY, Mar. 27, p. 22).

The two remaining issues, the reasonableness of the Bell System's proposed rates for installing and furnishing the warning-connector unit, and the provisions made for sales demonstrations of recording devices, will come up when the telephone companies submit their tariffs, which must be filed by July 2 under the commission's order to become effective not later than Aug. 2.

Another change made by the commission, also at the instance of the telephone companies, was in revising the requirement on the frequency of occurrence of the tone signal to not less than 12 seconds and not more than 18 seconds. It was understood that this will permit more economical equipment than the previous maximum spacing of 15 seconds.

V V

Upholds Idaho Law Banning Secondary Boycotts in Strikes

Validity of a 1947 Idaho law prohibiting secondary boycotts in labor disputes was upheld May 12 by Third District Court Judge C. E. Winstead.

The ruling was made in a suit charging four Western Electric Co. employes with conducting a secondary boycott in picketing the Mountain States Telephone & Telegraph Co. during a labor dispute in May, 1947.

The four employes were convicted in a justice court and had appealed to the district court.

In a memorandum decision overruling demurrers filed by the four defendants, Judge Winstead pointed out that the 1947 Taft Hartley Act prohibits secondary boycotts "thus giving federal statutory approval of the principle here involved."

The court also held that the state law was "within the powers and prerogatives of the Idaho Legislature under the Idaho Constitution."

PT&T to Issue Stock

The Pacific Telephone & Telegraph Co. was authorized by the California Public Utilities Commission on May 18 to issue $60,126,200 worth of common shares of its capital stock.

The purpose of the issuance is to reimburse the treasury and finance improvements, it was stated.

Kearney, Neb., Independent Permitted to Increase Rates

The Nebraska State Railway Commission has authorized the Kearney County Independent Telephone Co., Norman, to increase monthly rates June 20th on all classes of service from $1.75 to $2.00 where subscriber-owned and from $2.00 to $2.25 on all company owned stations.

Harry Bergsten, secretary of the company, told the commission that of the 294 telephones in service, 232 were owned by subscribers.

one minute —

to make a perfect splice!

Nicopress SLEEVES AND TOOLS

All you do is clean the ends of the wire, insert wire in sleeve, and compress with the Nicopress tool. Time, one minute—result, a perfect splice, neat and stronger than the rated breaking strength of the conductors. Order your Nicopress sleeves and tools from Leich.

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EVERYTHING FOR THE TELEPHONE INDUSTRY

more and more linemen are using these fine Bernard side cutting Pliers

There are no finer lineman's pliers than these heavy duty BERNARDs. They readily meet the quality requirements of utilities throughout the country. Linemen like them. They feel right; they cut right; they hold right. And they stand up under the hardest usage.

Faithful *Quality Since 1870*

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Two Illinois Independents Adopt New Rate Schedules

The Forreston (Ill.) Mutual Telephone Co. and the Gridley (Ill.) Telephone Co. have adopted the following rate schedules as authorized by the Illinois Commerce Commission.

Forreston Mutual Telephone Co.

Class of Service	No. of Stations	Net Annual Rate Present	Authorized
One-party, business ...		$18.00	$36.00
One-party, residence ..		24.00	30.00
Party residence ..		18.00	24.00
Rural multi-party		18.00	24.00
Extension ...		....	12.00

Gridley Telephone Co.

Business			
One-party .	39	$27.00	$33.00
Two-party .	..	21.00	27.00
Residence			
One-party .	6	27.00	33.00
Two-party .	4	....	27.00
Four-party .	218	21.00	21.00
Rural-multi-party ...	80	18.00	24.00
Business extension ..	4	12.00	12.00
Switching service	174	7.50	7.50

V V

REA, Wisconsin Telephone Co. Sign Pole-Sharing Contract

The first general agreement providing for the joint use of utility poles between a telephone company and a Rural Electric (REA) Co-operative in Wisconsin has been concluded with the signing of a contract by the Lafayette Electric Co-operative at Darlington, and the Wisconsin Telephone Co., it was announced recently.

The pole-sharing contract is considered a forerunner to establishment of similar agreements between Rural Electric Co-operatives and the telephone company for the joint use of pole facilities in other rural areas of the state.

Collaboration of the telephone and rural electric power groups will expedite extension of the two services in rural areas and will enable it to be done in most instances without duplicating pole line construction.

V V

Idaho Exchanges Get Increases

Rate increases of 50 cents for residence and business telephones were granted recently to the Midvale Telephone Exchange and the Cambridge Telephone Exchange by the Idaho Public Utilities Commission. The latter company also received permission to raise switching charges by 25 cents.

How to Enjoy

BETTER

Public Relations

for LESS *Money*

You have a mighty important story to *tell*—you have a vital service to *sell*. Perhaps you're not looking for too much new business at present—but you do have to keep subscribers *sold* on your ability to best serve them.

A well planned advertising and public relations program will help do that job for you. The Telephone Advertising Institute offers you such a program at a fraction of what it would cost you to do it yourself.

A complete newspaper advertising mat service—posters, booth and counter cards, radio announcements, bill inserts, telephone advertising news service, plus the Telephone Advertising Digest—are all included in our service to you.

Investigate this *low* cost-*high* value advertising and public relations plan today!

TELEPHONE ADVERTISING INSTITUTE

326 WEST MADISON STREET
CHICAGO 6, ILLINOIS

Now Serving More Than 1000 Independent Telephone Exchanges

R. M. Coleman Named Chairman Of Kentucky Commission

Appointment of Robert M. Coleman, Bowling Green, to the chairmanship of the Kentucky Public Service Commission, succeeding Charles E. Whittle, a Republican, was announced May 13 by Gov. Earle Clements. Mr. Whittle and Cass R. Walden, Republican, will continue to serve on the commission.

Mr. Coleman was first named to the commission on Mar. 16, replacing Jesse K. Lewis, Democrat, whose term had expired.

The commission, meanwhile, reported that J. A. Wallace of Metcalfe County has been employed as senior investigator and that L. J. Neumeister of Glasgow has been engaged as a senior telephone engineer. Mr. Wallace is a former director of the farmers R.E.A. co-op at Glasgow. Mr. Neumeister was associated for 10 years with the Ohio Bell Telephone Co.

V V

N. Y. Supreme Court Dismisses Telephone Rate Refunds Suit

A suit in equity by subscribers for pro rata refund of money paid for telephone service not rendered during a strike of telephone employes has been dismissed by the Supreme Court of New York *(Kennerley et al v. New York Telephone Co.)*.

In granting a motion filed by the company to dismiss the action, the court said that: (1) The suit was not representative, (2) there was no community of interest, (3) no fiduciary relationship was shown, (4) no ground existed for a declaratory judgment, and (5) "there is a full, adequate and complete remedy at law available to each subscriber to sue to get back any excess charge paid."

The action was brought by a residence and a business subscriber on behalf of themselves and of others similarly situated for an accounting, a declaratory judgment and a refund. They alleged the existence of a constructive trust predicated upon payment of charges under duress. Their complaint asserted that during the strike they were prevented from using their telephones for toll messages unless of an emergency character and from obtaining "information" and "other services furnished" by the company.

V V

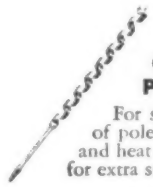
Approves New Rate Schedule For Two California Cities

Subscribers in Inglewood and Hawthorne, Calif. will pay from 25 cents to $2.25 more for extended area and local services under a schedule of rate

Push pipe under ground at rate of two feet a minute with Hydraulic Pipe Pusher

With a GREENLEE Pusher and Power Pump you can *push pipe* through the ground *easily, quickly*—under streets, walks, railways, lawns, flooring and other obstacles. Eliminates extensive ditching as just a short trench accommodates the Pusher . . . no tearing up of pavement, floors, lawns . . . eliminates back-filling, tamping, tunneling, repaving. Cuts job time to a fraction!

Other timesaving GREENLEE tools for telephone work



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For smooth, fast boring of pole holes. Tough alloy and heat-treated throughout for extra strength.

BELL HANGERS' DRILLS
Fast working "Feeler Bit" type with wire-pulling hole near point. High-grade alloy steel. Heat treated.

ELECTRICIANS' AUGER BITS
Fast, smooth boring. Of special design for electrical installation work. Precisely ground twists for fast chip clearance.

EXPANSIVE BITS
With wide, open throat for fast chip clearance. Bore holes ½" to 4". In two types: Plain and Setfast.

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Send for complete information now on GREENLEE timesaving tools for telephone installation work. Write Greenlee Tool Co., Division of Greenlee Bros. & Co., 2065 Columbia Ave., Rockford, Illinois.

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Designed and made
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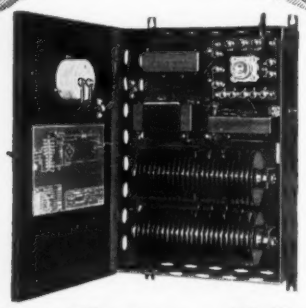

Battery Chargers - All Types

Automatic chargers. Trickle chargers. For all telephone service. All capacities – 1 to 12 amperes; 24 to 48 volts. Other capacities available to meet individual requirements.

Battery Eliminators - All Types

For all telephone service. For Lamp Signal (PBX), and Automatic (PAX) Systems. With or without Power-off Relay. Capacities of 0.5 to 6 amperes, from 12 to 48 volts.

Write for Circular 1462
Order from Your Jobber

ELECTROX DIVISION
THE SCHAUER MACHINE CO.

2056 Reading Road - Cincinnati 2, Ohio

changes recently approved by the California Public Utilities Commission. They will still be able to secure local service only, if they desire it.

Pacific Telephone & Telegraph Co. requests to cancel all forms of local service were denied by the commission and though business rates were raised, residence rates were practically undisturbed except where four-party extended service is now offered.

All company requests to cancel Inglewood local service were refused but the company was allowed to increase its rates from $2.50 to $3.00 on the individual residence rate; two-party, $2.25 to $2.50; four-party, $2.00 to $2.25.

On business telephones the individual flat rate went from $4.00 to $6.25 and for two-party, from $3.25 to $5.25 in Inglewood.

Inglewood extended service subscribers will pay more for individual and four-party flat rate service but only the prevailing rate for two-party service. Los Angeles extended area subscribers in Morningside Park will continue to pay the same basic rates except for supplemental and PBX equipment.

For Inglewood extended service, the commission granted an increase of 25 cents to raise the individual flat rate to $3.50 from $3.25. New four-party service was set at $2.50, 50 cents less than the company's $3.00 request. On the individual message rate service, the fee went up to $4.25 for 75 message units as opposed to the company's request for $5.00 for 70 units.

Rates on Hawthorne extended service will remain the same. Four-party flat rate service was set at $2.50, the company request for $3.00 being denied. Local service business rates were increased to $5.25 on the individual flat rate and to $4.25 on the two-party flat rate. Both were $1.00 increases. Also refused was the company request that such service be cancelled.

V V

Penn. Company Reclassified As Connecting Carrier

The Pennsylvania Telephone Corp., Erie, has been reclassified as a connecting carrier within the meaning of Section 2(b)(2) of the Communications Act. It is understood that the application for reclassification was based on evidence that the company no longer owned a toll line extending across a state line.

According to FCC records there are still 84 Independent companies subject to its full jurisdiction. Of these 44 are Class "A" and "B" companies.

Have you ever checked the number of times your operators "plug-in" for calls? It might surprise you!
OPERATORS BREASTPLATE CORDS
Also operators receiver and transmitter cords to fit any type instrument. You'll like RUNZEL'S fast service.

The severe use a telephone cord receives even under normal conditions, demands very definite manufacturing precision in its making to withstand the hard usage it must undergo in service.

RUNZEL cords, in the process of manufacture are subjected to constant and varied inspections for smoothness, tensile strength and trimming, all of which make up the features of added life and clarity of reception characteristic of our cords.
SWITCHBOARD CORDS
to fit all makes of switchboard plugs. Available in red, white and green. Standard lengths 4, 5 and 6 feet carried in stock. Other lengths to order.

When you replace your service with RUNZEL cords you may expect the best in construction, flexibility and appearance—and you won't be disappointed. You can RELY ON RUNZEL.

We are equipped and stocked to give you prompt service on any cord replacement. If you are not acquainted with RUNZEL code numbers, please give us original Manufacturers code number when ordering.

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PT&T Sues Directory Corp. For Copyright Infringement

Copyright infringement and unfair competition were charged in a suit filed in Federal Court recently by the Pacific Telephone & Telegraph Co. against the Independent Directory Corp., Los Angeles, Calif.

Alleging that the Independent Corp. used advertisements appearing in the classified telephone directory to sell similar ads in its own publication, the telephone company asked for an injunction to halt the asserted practice. Indeterminate damages, to be fixed by the court, also are sought.

V V

N. C. Company Asks Rate Raise To Meet High Operation Costs

The Carolina Mountain Telephone Co., Enka, asked permission to increase its rates by approximately $5,000 per year at a hearing May 19 before the North Carolina Utilities Commission (TELEPHONY, Mar. 27, p. 22).

New rates proposed by the company would increase the monthly cost of residential telephones by 50 cents and business service by $1.00. The company said that the raise is needed to meet rising operation costs.

The company serves approximately 1,800 subscribers through exchanges at Enka, Marion, Candler, Leicester, Burnsville, Bakersville and Hot Springs.

V V

Buys Telephone System

The Kerrville (Tex.) Telephone Co. has purchased the telephone system at the Veterans Hospital at Legion, it was reported recently. D. H. Comparette of the Kerrville company has announced that a dial system would be installed.

V V

Expansion Program Announced

A $1,250,000 expansion and modernization program covering a four-year period was announced recently for the Chenango & Unadilla Telephone Corp., Norwich, N. Y., by William A. Seely, president. The expansion program will include a new office building, conversion to a dial system, and new central office buildings in Oxford, New Berlin, Sherburne, Guilford and Smyrna.

V V

Two Named Managers

W. G. Patrick has been named manager of the Carolina Telephone & Telegraph Co. exchange at Dunn, N. C., succeeding J. T. Creech, who is now manager of the company's Rocky Mount, N. C., exchange.

GraybaR
TELEPHONE SUPPLIES
BULLETIN

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When you want drop wire, bridle wire, or inside, jumper, or duct wire, there just isn't any point in using anything but Whitney Blake. For this line — made of top-quality materials, including Teleprene and Plastite insulations — really has "been through the mill" of laboratory and field tests . . . and has come through with superior ratings in all characteristics!

W-B wire is one of the hundreds of telephone supplies which Graybar distributes. They're *all* first-quality products of leading manufacturers.

Whatever your supply requirements, the easiest way to get them is to call our nearest office. A Graybar specialist can be of real help in solving any of your electrical problems. *Graybar Electric Company. Executive offices: Graybar Building, New York 17, N. Y.*
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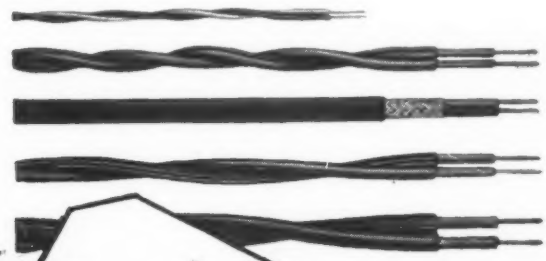

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Whenever you order anything electrical from Graybar, your requirements *do* receive the personal attention of our stockholders. Graybar is wholly owned by its operating and retired personnel. That's one reason why Graybar people — together forming a huge, nation-wide organization — apply to each job the sense of personal responsibility you associate with a small, well run, *local* business.

Elect Officers, Directors of Red Jacket Telephone Co.

Don M. Walker was elected president of the Red Jacket Telephone Co., Shortsville, N. Y., at a recent meeting of the board of directors. Other officers named were W. M. Griswold, vice president, and Mrs. Leone Walker, secretary-treasurer.

Directors chosen at the meeting were Mr. and Mrs. Walker, Mr. Griswold, Glenn S. Lord, Canandaigua; B. Bennett Brown, Willis C. Ellis and Ernest Brown, all of Shortsville.

Elected Secretary-Manager

Bruce Hall has been elected secretary-manager of the Farmers Telephone Co. of Dodge County, North Bend, Neb., to succeed C. L. Kelly, who died in April. Henry Tank, a director, has been temporarily in charge of the headquarters office at North Bend.

V V

Opens 6,850 Mile Link

The long lines department of the American Telephone & Telegraph Co. recently opened a new 6,850-mile telephone communications link between the United States and the Anglo-Egyptian Sudan. Service will be by means of radio-telephone to Cairo and by land lines from Cairo to Khartoum.

V V

Needs Higher Rates to Offset Costs, Ohio Company Asserts

Higher costs of operation were cited by the Ohio Associated Telephone Co., Marion, requesting rate increases for its 32 exchanges, in a hearing before the Ohio Public Utilities Commission on May 18.

Clare Williams, general manager, testified that the company, serving 14,070 subscribers in 11 counties of the Philadelphia-Dover district, has made improvements in the last eight years despite the fact that it has faced steadily increasing costs for materials and labor and difficulty in obtaining supplies.

V V

Lincoln T&T Seeks Permission To Sell $250,000 in Stock

The Nebraska State Railway Commission has set July 12 as the date for a public hearing on the application of the Lincoln (Neb.) Telephone & Telegraph Co. to issue and sell $250,000 in stock.

The company is seeking permission to sell 15,000 shares of common stock with a par value of $16.66⅔ per share, at not less than $20 per share.

V V

To File Rate Sheets

The Britton (Mich.) Telephone Co. has been ordered by the Michigan Public Service Commission to file rate sheets including the proposed changes in its previous petition for additional revenue.

V V

Summary of Commission Rulings and Hearings

Illinois Commerce Commission

May 25: Continued hearing on application of Middle States Telephone Co., Park Ridge, for authority to increase rates.

Kansas Corporation Commission

June 1: Hearing on application of Wayne H. Elliott, Alton, for permission to furnish telephone service in Alton.

June 8: Hearing on complaint against Missouri Union Telephone Co., Richards, Mo., Fulton Telephone Co., Fulton, and Southwestern Bell Telephone Co. by subscribers desiring service out of Ft. Scott.

June 8: Hearing on application of South Dickinson Mutual Telephone Co., Navarre, for authority to change rates.

Minnesota Railroad & Warehouse Commission

June 7: Hearing on rate application of Bricelyn (Minn.) Mutual Telephone Co.

Sun Dials Count Only the Bright Hours...

...but industry must count every hour ...make every hour count. Two decades of experience have developed in the Loomis organization the qualities of sales initiative and flexibility based on positive selling methods, that make the most of bright prosperous days...and maintain that maximum during days of dark uncertainty. These tested and proved methods have brought millions in directory advertising revenue to hundreds of Loomis clients the nation over.

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UPPER DARBY (Phila.) PA.
OMAHA, NEBR.

June 8: Hearings on rate applications of Racine (Minn.) Telephone Co., Dexter (Minn.) Telephone Co., and Winona County Telephone Co., Lewiston, for its Lewiston, Altura, and Rolling Stone exchanges.

June 9: Hearings on rate applications of Pine Island (Minn.) Telephone Co. and G. O. Miller Telephone Co., White Rock, for its White Rock and Goodhue exchanges.

June 24: Hearing on rate application of Minnesota Telephone Co., Minneapolis, for its Kandiyohi, Svea, Raymond and Willmar exchanges.

New York Public Service Commission

May 24: Commission investigation of rates and regulations of Rochester (N. Y.) Telephone Corp.

May 24: Hearings on petitions of: (1) Cato & Meridian Telephone Co., Cato, to change its par value shares to shares with and without par value, and to issue and sell 2,864 shares of common stock without par value; (2) Chatham (N. Y.) Telephone Corp. and Columbia & Rensselaer Telephone & Telegraph Co., West Lebanon, to issue capital stock, notes and to consolidate.

May 27: Hearing on petition of New York Telephone Co. to issue $90,000,000 of refunded mortgage bonds.

Oklahoma Corporation Commission

June 2: Hearings on exceptions of Luther Morris to commission's declaration of Savanna and surrounding area as open territory.

June 10: Continued commission investigation of why 44 sections of Stilwell (Okla.) Telephone Co. territory have not been declared open.

June 16: Continued hearing on application of Southwestern Bell Telephone Co., Southwestern Associated Telephone Co., Lubbock, Tex., Southwestern States Telephone Co. of Brownwood, Tex., and Oklahoma Telephone Co., Broken Arrow, for continuance of rules, similar to those of expired federal regulation U-2 governing order of service installation.

June 22: Continued hearing on application of the residents of Moore, requesting that the Southwestern States Telephone Co. of Brownwood, Tex., be required to give adequate service.

July 30: Hearing on application of Lookeba (Okla.) Telephone Co. for exceptions to commission examiner's recommendation for denial of increased switching rates.

Sept. 7: Hearing on application of Wayne residents for automatic dial exchange installation by the Southwestern States Telephone Co., Brownwood, Tex.

Pennsylvania Public Utility Commission

May 27 and 28: Continued commission investigation of rates, charges and service of the Bell Telephone Co. of Pennsylvania in exchange areas of the Pittsburgh district.

Wisconsin Public Service Commission

May 27: Commission investigation of service and facilities of Canton (Wis.) Farmers Telephone Co.

May 28: Hearings on applications of Boscobel (Wis.) Telephone Co., Northwest Telephone Co., Tomah, and Milton & Milton Junction (Wis.) Telephone Co. for authority to increase rates.

ENDURANCE

TELEPHONE WIRES

GENERAL INSULATED WIRE WORKS, INC.

ENDUR-PRENE MEANS

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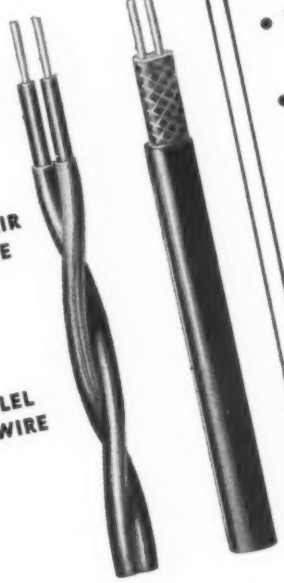

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Samples of Endur-Prene drop and bridle wires are available —wire or write today.

OUTSIDE WIRES—Drop, bridle and tree—sizes 14 to 22—B&S, bronze, copperweld, copper and iron conductors, rubber insulated, cotton braided.

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Plastic insulaton is particularly adapted for inside jumper and duct wires, has bright colors for identification, smaller diameters, is flame and moisture proof, offers high resistance to abrasion and will not support fungus growth.

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One of the first sales managerial installations of the mobile radio-telephone by a manufacturer selling exclusively to industry has just been made in the car of M. W. Heinritz, vice president in charge of sales of the Gould Storage Battery Corp., Trenton, N. J.

He uses the system for instant contact with company offices, plants, customers, and sales districts, as well as his advertising agency, during that considerable portion of his time away from his bases in Trenton, St. Paul, and Depew, N. Y. It gives him greater "freedom of movement," and is "the ideal solution to the problem of keeping in touch with the hourly developments that are a part of making decisions in this fast-moving business of selling industrial storage batteries."

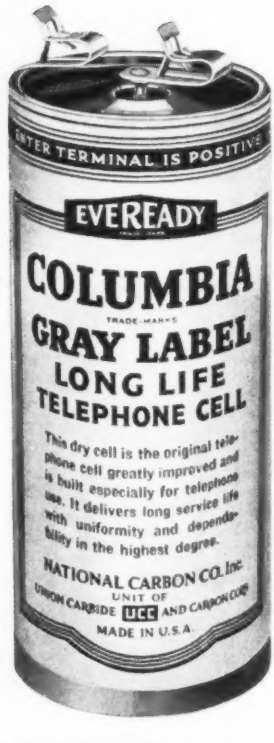
Although the use of the mobile radio-telephone by trucking, maintenance and taxicab fleets is not particularly new in some of the larger cities, telephone authorities report that this use of the radio-telephone in a private automobile for industrial sales purposes is probably a "first." From the advantages which have already been demonstrated by Mr. Heinritz, officials of the New Jersey Bell Telephone Co. feel sure that the use of the mobile radio-telephone will spread rapidly among sales executives as a means of keeping their fingers on the pulse of their businesses.

Mr. Heinritz has his mobile radio-telephone installed in his personal car, used regularly on company business. He can be reached while in his car within five to 10 miles of either side of U. S. Route No. 1 between Boston and Washington, and along the highway between New York and Buffalo via Albany. His car, like others equipped with mobile radio-telephone service, is assigned two frequencies, one for receiving and one for transmitting receptions.

Mr. Heinritz has already had specific demonstrations of the value of his mobile radio-telephone unit, and he feels that in one instance at least it has saved considerable more than its cost of installation and operation. Recently he was delayed while calling upon one eastern customer, and was late for the following appointment. Furthermore, it became necessary to converse with headquarters in St. Paul before seeing the customer at the next stop. As he left for his second appointment, he put in a call over the mobile radio-telephone for St. Paul. It took some time to get through because of busy lines. In the meantime, Mr. Heinritz was able to drive to the place of his next appointment without having to wait for the call. The result was that he was able not only to inform his customer that he would be late, but to get the necessary information before he arrived. These and similar experiences have made Gould enthusiastic supporters of the unique conveniences and the business advantages offered by the mobile radio-telephone.

Enroute from Trenton to Pittsburgh, M. W. Heinritz, vice president in charge of sales, Gould Storage Battery Corp., calls office over mobile radio-telephone.

millions in service testify to their uniformity and long life—


ENTER TERMINAL IS POSITIVE
EVEREADY
COLUMBIA
TRADE-MARKS
GRAY LABEL
LONG LIFE
TELEPHONE CELL
This dry cell is the original telephone cell greatly improved and is built especially for telephone use. It delivers long service life with uniformity and dependability in the highest degree.
NATIONAL CARBON CO. Inc.
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UNION CARBIDE UCC AND CARBON CORP.
MADE IN U.S.A.

● Eveready, Columbia Gray Label Dry Cells need no introduction to the telephone industry. Year after year these batteries furnish dependable power for telephones all over these United States. Their sustained voltage insures good transmission longer. Order these better batteries from Leich. Check Leich on all your supply needs.

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EVERYTHING FOR THE TELEPHONE INDUSTRY

Principles of Enduring Business

By JOHN S. ALLEN

Manager Applies Psychology

ONE MORNING the sales manager of a large life insurance company called his 20 salesmen into his office for a conference. He remarked that the business was not going as well as he thought it was reasonable to expect. Also, he mentioned that not as many daily calls were made as he had anticipated. He then asked each man exactly how many calls he had made the previous day and how many calls each had scheduled for that morning and afternoon.

The general manager purposely made this a very short meeting, during which he hoped he had accomplished three very important things. First, he had frankly discussed and shared internal company conditions with the salesmen, thereby placing a direct burden of responsibility for its growth on their shoulders. Second, he made each salesman look sharply upon himself as an asset to the organization by asking for an exact statement about his calls the previous day. Third, he put each man into competition against his own record, as well as the records of the other men, thereby inviting personal pride in achievement.

The manager called these short meetings each morning for several days and began to notice a sharp change in the men's attitudes and an increase in the number of sales calls. Sales began to increase and the percentage of effort went higher and higher, with the exception of one salesman who had a lot of ability, but through inertia never got around to doing his work. By cleverly giving his bad record the limelight and by making a good many subtle comparisons, the sales manager prompted this man into the habit of work.

Up in the air...

You work with Comfort, Safety & Confidence in a

Buckingham

INDUSTRIAL SAFETY SEAT

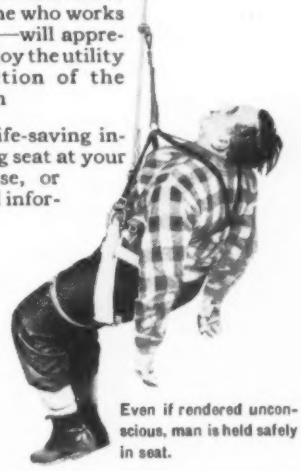
Greater freedom of movement . . . added comfort . . . and sure protection against falling from the seat, whether conscious or not—rigging workers have all these advantages in the BUCKINGHAM Safety Suspension Seat.

The picture shows how the load is carried by the heavy wrought iron hook. The rigid wood seat, which cannot become dislodged while in use, provides more comfortable support for the worker, preventing the binding and constriction encountered in rope or strap slings. Leg straps keep the 5¾" seat always in proper position.

Use of the chest harness makes it impossible for the man to topple from this suspension seat, either from vigorous movement, or from loss of control through sudden illness, accident, sunstroke, gas fumes. The safety cord, fastening to the carrying rope or cable above the worker's head, keeps the user's body approximately in normal position in event of emergency . . . yet does not interfere with customary activity.

Electricians, riggers, steeplejacks, tree surgeons, inspectors, steel-workers, painters, maintenance men—anyone who works from a sling—will appreciate and enjoy the utility and protection of the Buckingham

See this life-saving industrial sling seat at your supply house, or write for full information.



Even if rendered unconscious, man is held safely in seat.

BUCKINGHAM MANFACTURING CO., INC.

Binghamton, N. Y.

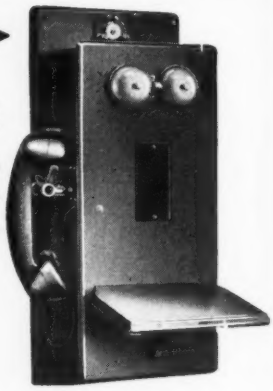
From This to This

MODERNIZE

your old style magneto wall telephone into an attractive hand-set type

WITH THE NEW

"DAN-MAC" Conversion Kit



Just a few minutes with a screw driver does the job. Complete to the last screw; the handset is the latest design using all position capsule type transmitter and receiver to insure high quality transmission and reception.

THE COMPLETE KIT $8.95 F.O.B. CHICAGO.

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TREATING PLANT
EAST POINT, GA.

Mailing Address
P.O. Box 31, Station "A"
Atlanta, Ga.

Rural Line Transmission

(Concluded from page 26)

ringer is used, the bridged loss of stations usually is not serious. However, with some of the older type ringers, the bridged loss may be as high as two decibels per ringer. If this high loss in transmission quality is not considered in the design of the line, poor transmission loss invariably will be experienced.

Noise is perhaps the most serious detriment to good rural line transmission. This may result from electrical unbalances in the line wire or low insulation due to tree leakage, but the most common cause at the present time is due to power line parallels. It is most difficult in many locations to find a rural line without a power line running parallel to it. Proper coordination between power and telephone circuits will greatly reduce troublesome power line noise.

In planning new rural lines, it is necessary to locate them as far away from power lines as possible and to make certain that a satisfactory transposition scheme is used. The days of non-transposed rural lines are past.

Some companies are now considering joint construction of rural telephone and power lines. This practice does not present any serious difficulties when cable is used, but when open wire is strung on the same poles with power, extreme care in engineering and construction is necessary. When this type of construction is anticipated, it is imperative that careful consideration be given to the coordination of the two services before initial construction is begun. There are several installations of joint telephone and power lines which have been in service for many years and these have proved that this type of construction is entirely possible when it has been engineered carefully.

We in this country have boasted for years about our universal telephone system. It seems that in this boasting we conveniently forgot the poor relatives, our rural lines. Now, the poor relatives have come into money and are being heard from as they, too, are using toll service. There appears to be every indication that our poor relations are to be admitted into the telephone family and that the rural line of the not far distant future will provide the same level of transmission as the city telephone after it has been connected into the universal toll plan.

SERVING YOU THROUGH SCIENCE

U. S. WIRES

FOR ALL

TELEPHONE NEEDS

- DROP WIRES
- BRIDLE WIRES
- INSIDE WIRES
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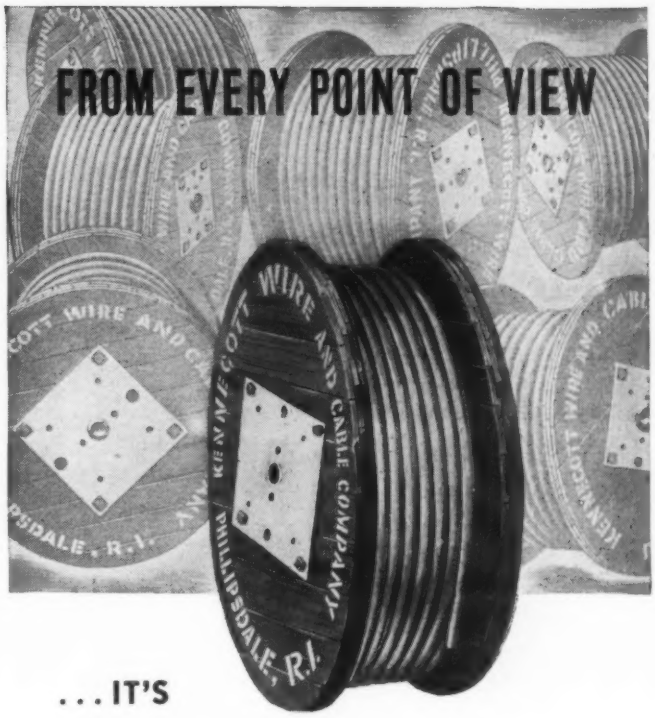

. . . IT'S

KENNECOTT for cable!

No matter what features are especially important to you in telephone cable construction, you can be sure they will receive careful attention in the manufacture of Kennecott Cable. Every effort is constantly being made to insure cable of good quality.

For further information on Kennecott Telephone Cable, just write or telephone the Chase Office nearest you. See list below.

Chase Brass & Copper Co. is an affiliate company of Kennecott Wire and Cable, with 25 sales offices (22 of them warehouses) in leading industrial centers from coast to coast.

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ALBANY† ATLANTA BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† SAN FRANCISCO SEATTLE ST. LOUIS WATERBURY

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THE TREND

is toward contracting for outside construction jobs and maintenance work

For several years now, many wise telephone companies have been letting contracts to construction specialists, rather than keeping on an extra large staff and doing the work themselves. It has paid dividends. Why not investigate the saving that can be effected by contracting for those special outside construction jobs?

We offer construction and maintenance services for telephone companies at costs well within your budget. Expert cable spinning is only one of the many services we render, as we specialize on general outside plant work. A letter or card will bring full information.

NEALE

Construction Co.

Engineering

Construction

Maintenance

TOPEKA • KANSAS

Phone 31829

ABC of the Telephone

(Continued from page 24)

A. Operation of trip circuit.
   1. Ringing current on line operates (R).
   2. (R) operates (R1).
      a. (R1) locks.
      b. Lights call lamp.
      c. Energizes buzzer.
   3. (TA) operated by (R1).

B. Subscriber answers call.
   1. Talk key operated.
   2. (S) operated by instrument short.
   3. (S) operates (T) and (B).
      a. (T) cuts through toll grade transmission.
   4. (B) performs these functions:
      a. Releases (R1).
      b. Buzzer silenced.
      c. Call lamp extinguished.
      d. Busy lamp lights.

C. Etc.

In this outline relays have been designated by a letter or letters enclosed in parenthesis marks, such as (R) which refers to relay marked "R."

In the simplified code of recording circuit sequence certain symbols are used to abbreviate the various circuit functions. Typical symbols are:

\+ means operated
— means released
¢ means connects

Using this method, the circuit sequence outlined in Part I could be arranged to show relay operations in the following manner:

Circuit Action	*Result*
Ringing current on line	+(R)
+(R)	+(R1)
+(R1)	+Call Lamp
	+Buzzer
	+(TA)
Subscriber answers call	
+Talk key	+(S)
+(S)	+(T)
	+(B)
+(T)	¢Toll grade transmission
+(B)	—(R1)
	+Busy lamp
—(R1)	—Call lamp
	—Buzzer

Pyramid Diagram

The pyramid diagram method of recording circuit sequence is shown in *Fig. 3*. This method provides a means of presenting a picture of circuit operation. The circuit action builds up in a logical manner and the function of each relay is illustrated. The symbols used in the simplified code are carried over in this method and guide lines are used to indicate the relays operated

Anything on spools, drums or reels can be paid out faster and more safely with Simplex Reel Jacks. Right and left hand bases enable operators to lift in sight of each other for easy jacking. "T" shaped base, with 3 threaded and adjustable tie rods, insures a firm, non-rocking foundation. Ask your supply house for full paticulars, or write for Bulletin U-46.

Simplex

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Jacks

TEMPLETON, KENLY & CO.

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American 4551 TELEPHONE BODY for Rural Work

MAINTENANCE • INSTALLATION • GENERAL SERVICE

Two views of American 4551 designed specifically for rural work. Mounts on any make ½ ton chassis.

American Body 4551 has plenty of room for all materials needed in rural work . . . and makes them quickly accessible.

Full inside body width of 40" provides room for the bulky items. Then on each side, compartments house the variety inventory, such as wire, hand lines and sub sets. Padded adjustable trays carry desk stands, test, telephone and sub sets.

Side compartments enclose shelves with adjustable partitions for small hardware, space for tool bag and kit. Other partitions make space for wood pins, pole steps, pole brackets, rubber gloves, etc. Tail gate, when dropped, can be used as a loading shelf. Optional equipment, for most types of chassis, includes a drop tail gate and bumper combination.

Overhead ladder brackets extend over cab and accommodates a 24 ft. extension ladder and a 6 ft. stepladder.

The neat, well balanced 4551 body affords an abundance of space and gives you a rolling storeroom for installing rural house sets and equipment for maintaining lines.

Here's dimensional data. If you have other questions, we will be glad to hear from you:

GENERAL DIMENSIONS

Overall length	70 inches
Inside width	40 inches
Height at front	42 inches
Height at rear	38¼ inches
Width of Compartment	15 inches
Weight (approx.)	650 lbs.

American
TS-76
Telephone Body
Here's the standard body for telephone installation, maintenance and general service . . . American TS-76.

THE *American* COACH & BODY COMPANY

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OFFICES 350 MADISON AVE., NEW YORK 17, N. Y. INSURANCE EXCHANGE BLDG., DES MOINES 9, IOWA

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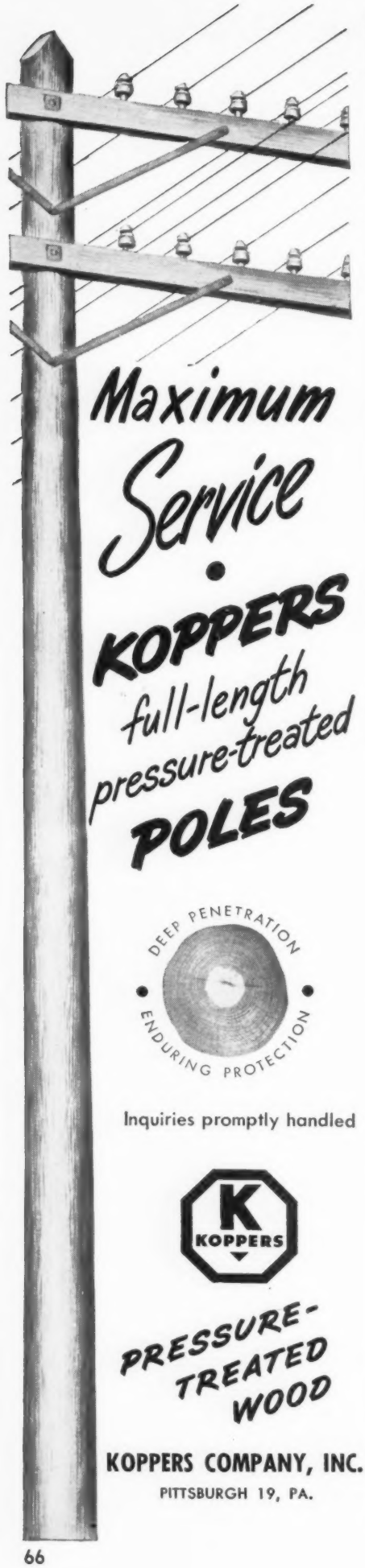

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Inquiries promptly handled

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PITTSBURGH 19, PA.

and other functions performed by particular relays.

Ball and Chain Diagram

One of the simplest and easiest of all methods of recording operating sequences is known as the ball and chain diagram. Use of the ball and chain method permits a flexible arrangement of symbols, and, by using connecting lines, all parts of the sequence can be tied together in proper relationship. An important advantage of the ball and chain diagram is the manner in which relays or lamps are designated as operated or released. A relay operated is indicated by a full circle. A relay released is indicated by a full circle with a lower section blocked in solid.

Where two or more separate relay circuits are involved in the same general operating sequence the two could be kept in proper relationship by using different colored pencils for each circuit. Preparation of a ball and chain diagram can be simplified by making a template on a piece of approximately one-eighth inch thick lucite. The template would consist of nothing more than several rows of equally spaced and uniformly sized holes drilled in a piece of lucite or other transparent material measuring approximately 3 ins. x 6 ins. in size. The use of a template permits the preparation of an easily understood sequence of any circuit to be made in a relatively short length of time.

The important thought is that some steps should be taken to place relay operating sequences in readily understandable form.

Thus, the telephone repairman has three important tools to use in locating relay circuit troubles:

(1) An operating sequence diagram to follow the sequence of the circuit.
(2) Schematic drawing to trace operating paths and relay contacts used.
(3) Wiring plan to use in the event the trouble is caused by improperly connected wires.

The next installment will dicuss how these tools are used in making an analysis of relay circuit operations.

Courtesy, Telephone Topics

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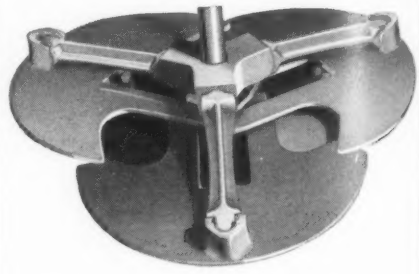
QUICKLY Installed
TOUGH For long life



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For new construction and maintenance — Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resiliant, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

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FAIRFIELD, IOWA

Pull Poles 5 Feet With One Hitch

New Van-Webb *Hydraulic* Pole Jack

Lifts 15,000 Lbs.
Hook Rises 60"

Total Wt. 60 Lbs.
Length 41"

No Derricks—No Rigging
Pull from Ground Base

SUTTLE EQUIPMENT CO.
LAWRENCEVILLE, ILLINOIS

DEPEND ON SUTTLE

Rural Plant Engineering

(Continued from page 21)

road side. To prevent the suspension bolt from bending after a few years' service, it is a good plan to use a reinforcement strap which is lagged or bolted to the pole above the suspension clamp.

When the strand is tensioned and clamped on the poles, the cable installation can be undertaken. A good labor saving arrangement is to mount the cable reel on a trailer which is pulled by a truck. The end of the cable is placed through a traveling cable straightener and anchored to the strand at the starting point. If a cable lasher or spinner is used, it is next placed on the strand and also hitched to the truck. As the truck moves forward, the cable is payed off the reel and lashed to the strand in one operation. When the end of a span is reached, the straightener and lashing machine is lifted around the pole and placed in position for lashing the span. Trained crews can string from one to 2½ miles of cable in an average eight-hour day with such an arrangement. The history of several rural cable jobs of this type indicates that the use of bonds and grade clamps is not necessary. The wrapping of the lashing wire around the strand and cable constitutes sufficient bonding, and also holds the cable firmly in place without slipping even on steep grades.

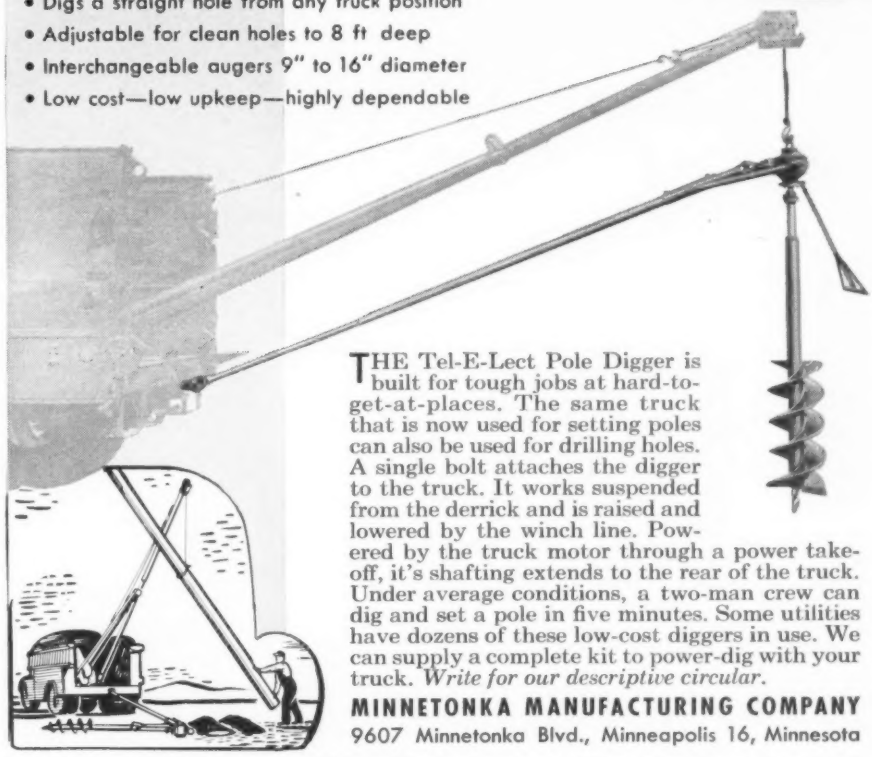
Regardless of the type of rural plant selected, its construction can be economically effected only if tried and proved labor saving tools and machinery are properly utilized. These tools are line trucks equipped with winch and pole derrick, earth boring machines, trenchers and backfilling machinery, etc. It is true that many companies, especially the smaller ones, do not have sufficient volume of work to justify the purchase of such equipment. In such cases, it is suggested that the services of an established contractor be considered. These contractors are equipped with all labor saving devices and are willing to perform construction work on a reasonable margin of profit. Often, small companies also can contract their plant construction work more cheaply than they could possibly handle it with their own men and equipment. In addition, the contractor can usually perform a better job since his men are specially trained in this type of work.

(Please turn to page 70)

DIG HOLES WITH YOUR LINE TRUCK AND CREW

TEL-E-LECT POLE HOLE DIGGER

- Digs a straight hole from any truck position
- Adjustable for clean holes to 8 ft deep
- Interchangeable augers 9" to 16" diameter
- Low cost—low upkeep—highly dependable



THE Tel-E-Lect Pole Digger is built for tough jobs at hard-to-get-at-places. The same truck that is now used for setting poles can also be used for drilling holes. A single bolt attaches the digger to the truck. It works suspended from the derrick and is raised and lowered by the winch line. Powered by the truck motor through a power take-off, it's shafting extends to the rear of the truck. Under average conditions, a two-man crew can dig and set a pole in five minutes. Some utilities have dozens of these low-cost diggers in use. We can supply a complete kit to power-dig with your truck. *Write for our descriptive circular.*

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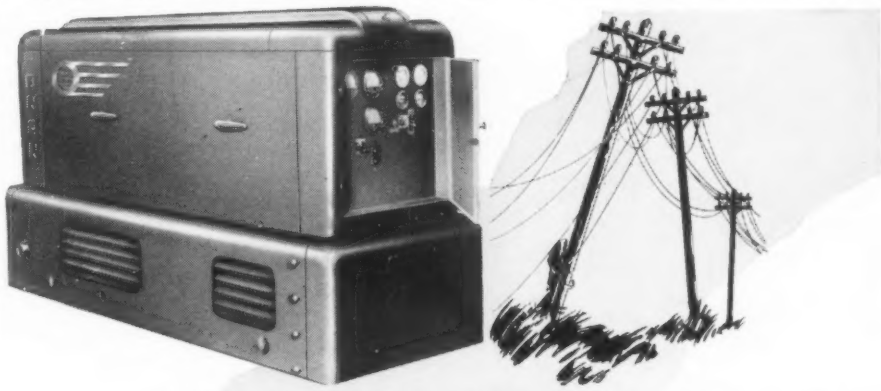

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Telephone service is vital when disaster strikes. Prevent breakdown of telephone systems due to power failure by installing an Onan Electric Plant. Plant starts automatically when power fails, provides current for the duration of the emergency, stops automatically when power is restored. Many models and sizes from 350 to 35,000 watts.

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Choose your Radiotelephone on the basis of

"FACTS" ...NOT "BRAGS"

Radiotelephone is too important an investment to be made on the basis of high-flown phrases and advertising slogans. It's easy to make claims that can't be proved and to so word statements that they seem to mean more than they do.

So, choose carefully. Make sure that claims are provable, that features mean something, and that specifications are understandable. The best test is to talk to people who have bought the equipment in question. Is it performing according to claims? *How much does it cost to maintain?* What kind of service does the manufacturer give? The manufacturer who has nothing to hide will welcome your skepticism.

Here are the *FACTS* about *Motorola* -compare them with all the others:

INDUSTRY LEADERSHIP

Motorola manufactures and installs more radiotelephone equipment than any other — BAR NONE. Motorola has more fully qualified mobile-radio developmental engineers in their laboratories devoting time *exclusively* to mobile radio problems than any other manufacturer — BAR NONE. Motorola has the largest mobile radiotelephone research laboratory and offers more product development than any other — BAR NONE. Motorola has pioneered more FM mobile radiotelephone "firsts" than any other manufacturer — BAR NONE: FIRST with 20 D.B. quieting at 0.4 microvolt input. FIRST commercially successful FM 2-way radiotelephone with FIRST noise compensated squelch that makes present day radio communications practicable. FIRST to successfully build equipment for the 152-162 mc. band. FIRST to develop the vibrator power supply in receivers, now accepted as the best power supply system. FIRST with "Precision Selectivity" for channel conservation. FIRST with Precision Cavity for intermodulation control.

ADVANCED DESIGN

Only Motorola guarantees full channel utilization through "PRECISION SELECTIVITY." P.S. provides extraordinary channel protection from nearby central stations and other man-made interference. Motorola's advanced design is your guarantee against early obsolescence.

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It's been proved — Motorola continues to operate when others fail. *Motorola takes less time out . . . costs you far less over the years than any other equipment regardless of initial price!*

PROVED PERFORMANCE

Hundreds of official records show Motorola equipment giving "like-new" service for over six years — with only limited routine maintenance required. Part for part, Motorola is the sturdiest equipment in the field today — and Motorola's rugged construction pays off for you.

VERIFY THE FACTS WITH THE PEOPLE WHO USE *Motorola* EQUIPMENT

A Motorola Communications Engineer will be glad to call and discuss radiotelephone as it concerns your specific problems. He'll put you in touch with people in your business who are using Motorola equipment. He'll give you FACTS, not fiction, FIGURES, not fables —

Write Today!

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FM 2-WAY RADIOTELEPHONE

Motorola Inc.
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A Complete Series of Standardized FWD BUILT-TO-CODE Fully Equipped Motorized Units—Engineered For Every Type of Line Construction & Maintenance Service

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Available in 38 varying but standardized combinations—each designated by individual CODE NUMBER—you can purchase a motorized unit equipped as you want it—with earth-boring machine, integral or T Type derrick, single or double drum winch, platform or compartment body, conventional or 5-man cab—in 3 models of four-wheel-drive trucks in capacities to meet every utility need. And you can simplify your purchasing by buying from a single, centralized source—The Four Wheel Drive Auto Company, who engineer and build the complete motorized unit—truck and component equipment.

For complete information and Code Chart, see Graybar or write to—

THE FOUR WHEEL DRIVE AUTO CO.
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Built-to-Code

MOTORIZED UNITS

FOR LINE CONSTRUCTION AND MAINTENANCE

Built By

FWD

Makers of America's Foremost Heavy Duty Truck

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DROP WIRE

17 GA BRONZE TWISTED PAIR

AND

PARALLEL NEOPRENE RE-INFORCED

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TWISTED PAIR BRAIDED SHIP FROM STOCK

(NOT GOVT. SURP.)

BUCKEYE
TELEPHONE & SUPPLY CO.
COLUMBUS, OHIO

It must be fully realized that no effort has been made to answer all of the complex questions concerning rural plant construction in this short article. We all agree that, while rural telephone service is a necessity, the revenue derived from it by operating companies is extremely small. Therefore, it is imperative that every economy be practiced in order to avoid serious decrements in providing this type of service. With this objective in view, it is hoped that the ideas expressed here will cause operating men, particularly those in small companies, to give this old subject serious thought and perhaps the problem will eventually be solved to the satisfaction of all.

V V

Federal Makes Changes in Mobile, Carrier Divisions

It has been announced by the Federal Telephone & Radio Corp., Clifton, N. J., that Earl Lipscomb Associates of Houston and Dallas, Tex., will represent Federal's wire transmission and transformer divisions in the southwest. This area will include Texas, Louisiana, Oklahoma, Arkansas and New Mexico.

Mr. Lipscomb is well known in the southwest territory as a result of 15 years with Western Union as transmission supervisor and five years as a consulting engineer. The services of his company will be devoted to the carrier systems field in the southwest part of the country which contains many railroad centers, oil and pipeline companies and Independent telephone companies — all highly interested in modernizing and enlarging their communications facilities.

EARL LIPSCOMB

Mr. Lipscomb is a pioneer in carrier system equipment. He supervised the installation of the first drop-channel carrier telephone system ever built,

THE LINE IS BUSY!

We mean the Production Line at our Plant where every effort is being made to supply the demand for this masterpiece of seating comfort.

MODEL 2451

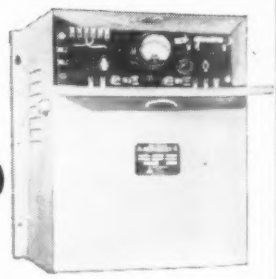
The operator's choice. One of two models. Adjustable in height. Rolled steel construction. Comfort speeds communication.

CRAMER Posture

CHAIR COMPANY
1205 CHARLOTTE STREET • KANSAS CITY 6, MO.

IT'S GOV'T SURPLUS!
IT'S BRAND NEW!
IT'S in the Original Cases

and it's only $49.50
F.O.B. New York



practically 1/5 of its original value

RAYTHEON
RECTICHARGERS W-3155

Supply current at a constant voltage and supplies current to a storage battery, providing an automatic AC-DC power system. Has no moving or expendable parts—therefore no frequent adjustment or maintenance is necessary. The life of the battery increases as much as 40%. Eliminates voltage variations.

Range of unit 11/12 cells, 22 to 24 volts @ 3 amp. Input supply source 95 to 130 volts, 60 cycles.

MICHAEL STAHL, Inc.
39-A Vesey Street
Tel. WOrth 4-2882 N. Y. 7, N. Y.

which ran between Houston and New Orleans on the Southern Pacific Railroad. He is a registered professional engineer, with memberships in the A.I.E.E., I.R.E. and Society of Professional Engineers.

Mr. Lipscomb, a native of Texas and graduate of Texas A. and M., served five years as a lieutenant commander in the U. S. Navy during World War II, during which he supervised the Navy's radar school at Massachusetts Institute of Technology. Later he served in the Materiel Division, Secretary of the Navy's Office, Washington, D. C., in the procurement and production of electronic equipment.

At the same time the Federal company announced that R. B. Rennaker, affiliated with the radio industry for the past 25 years, has been appointed sales manager of its mobile radio-telephone division.

R. B. RENNAKER

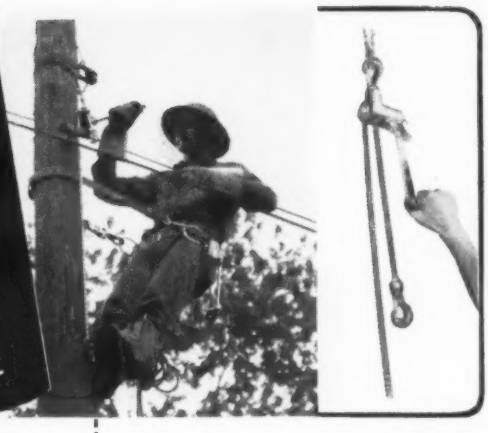
Mr. Rennaker was formerly associated with both the Mutual and Columbia Broadcasting systems in addition to serving in Washington, D. C., with the war department.

Beginning as a "ham" station radio operator while still in school, Mr. Rennaker later became a consulting engineer and part owner of a radio station in Indiana. In 1934, he became chief engineer for Station WFBM, where he remained for five years.

Mr. Rennaker joined Federal in 1945 as broadcast equipment sales engineer. He subsequently became associated with Collins Radio Co. for one year and rejoined Federal recently to assume his new duties in its sales force.

Why Linemen Like the COFFING "Mighty-Midget" PULLER

Makes Any Pulling Job EASIER — FASTER — SAFER



Weighs but 6½ pounds!

Easily pulls 500 pounds on any wire or messenger stringing job!

Compact — Quickly snaps on tool belt!

Tested to 50% overload!

"Safety-Load" Handle bends before any part of puller can give!

Handle can be used as lever or high-speed crank!

For use on heavier jobs — the "Safety-Pull" Ratchet Hoist; to stretch heavy guys or cable, lay underground conduit, etc. ¾ ton capacity model weighs but 14 pounds; eight other models handle up to 15 tons.

Ask your distributor or write for bulletin NMP-1 — shows an amazing variety of time-saving uses for the "Mighty-Midget."

Hoist Jacks; Load Binders; Differential Chain Hoists; Electric Hoists; Spur Geared Chain Hoists; Trolleys; Special Utility Maintenance Tools.

COFFING HOIST COMPANY

DANVILLE, ILLINOIS

Jenkins Bros. also make Diamond Seal Friction and Rubber Tapes which meet ASTM and Federal Specifications.

Gold Seal Tape sticks to the job tighter, longer. It does not dry out, ravel, peel, or smear the hands under any conditions. High quality base cloth plus laboratory control give Gold Seal lasting "tack"— high dielectric strength. Next time ask for Gold Seal — in single rolls or handy 10-roll containers— each roll cellophane wrapped. Jenkins Bros., (Rubber Div.), 80 White St., New York 13, N. Y.

JENKINS Gold Seal Tape FRICTION...RUBBER

Onan Issues Booklet on Generating Plants

How electricity is made available anywhere with portable electric generating plants that can be carried, wheeled or trucked to the job is shown in a new two-color folder recently released by D. W. Onan and Sons Inc., 43 Royalstone Ave., N., Minneapolis 5, Minn.

Onan electric plants, made portable by means of carrying handles and frames and rubber-tired, two-wheeled dollies, are pictured in models ranging from 350 watts to 3,000 watts in 115-volt, 60-cycle, alternating current. Direct current models of 115 volts also are described in 600 to 5,000-watt range. These portable models are powered by Onan air-cooled, four-cycle, gasoline engines.

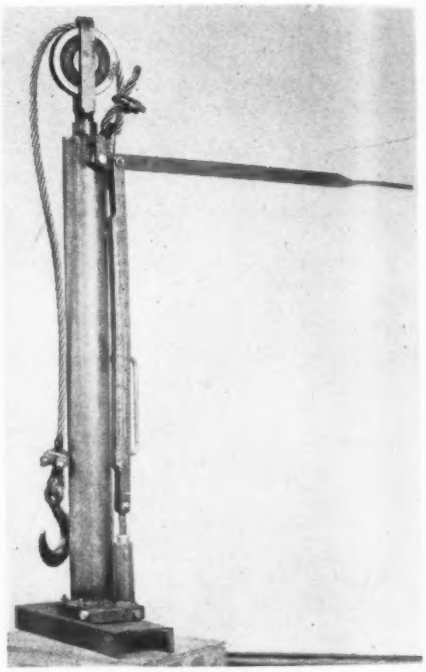
Water-cooled, large-capacity electric plants for trailer, skid or truck mounting, in sizes 2,000 to 35,000 watts a.c.; or 3,500 to 15,000 watt d.c. are also shown.

Interesting photos of Onan portable electric generating plants at work on the job are shown on the back cover.

V V

Suttle Distributor of Van-Web Pole Jack

The Suttle Equipment Co., Lawrenceville, Ill., has announced that it has been appointed exclusive distributor of the new Van-Web hydraulic pole jack for the telephone industry.



Van-Web pole jack

Among the features of the pole jack listed by the Suttle company are: (1) It has a raise lift of 60 ins. at the hook through the pulley that doubles the lift of the ram; (2) is capable of exerting a 15,000 pound pressure at the hook; (3) the jack with the ram depressed is 41 ins. long, and weighs 60 pounds; the pump handle is 25 ins. long and folds down to the side; (4) the pulley yoke is mounted on a loose piston so the whole yoke can be lifted out and a pike pole set in the cup at the top of the ram for straightening poles.

"They must be repairing the submarine cable."

Courtesy, Telephone Topics

New Digger Attaches To Any Line Truck

A regular line truck that is equipped with rear or front derrick can now be made to dig holes as well. The Tel-E-Lect pole digger, of the Minnetonka Mfg. Co., 9607 Minnetonka Blvd., Minneapolis 16, Minn., quickly attaches to the truck with only one bolt. It works suspended from the derrick, and is raised and lowered by the winch line.

Tel-E-Lect pole digger

With shafting extending to the rear, it is powered by the truck motor through a power take-off. There's no special power plant to cause maintenance problems, the company states.

A crew of two men can drill a hole in five minutes or less, it is said. Regardless of the truck position, the Tel-E-Lect digs a straight, clean hole. The digger is adjustable up to eight feet deep, and has interchangeable augers from nine to 16 ins. in diameter. The manufacturer supplies a complete kit to convert trucks for power digging.

V V

»Expansion: There are more telephone switchboard operators working in the White House today than President Grover Cleveland had employes on his entire executive staff.

ODDS 'N ENDS

Ruth Liberman, Roney Plaza Hotel, Miami Beach, Fla., knows 5,236 telephone numbers by memory.

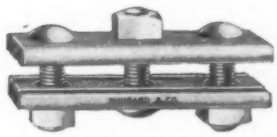
COMMUNICATION ENGINEER

Large engineering firm in New York desires communication engineer with 8 to 10 years' experience in design engineering, economic studies, preparation of specifications and technical reports; also should be familiar with telephone equipment and apparatus. Please submit complete resumé to Box No. 2568, c/o TELEPHONY.

JOHN LINEMAN OFFERS..

The Hubbard GRIP of SECURITY

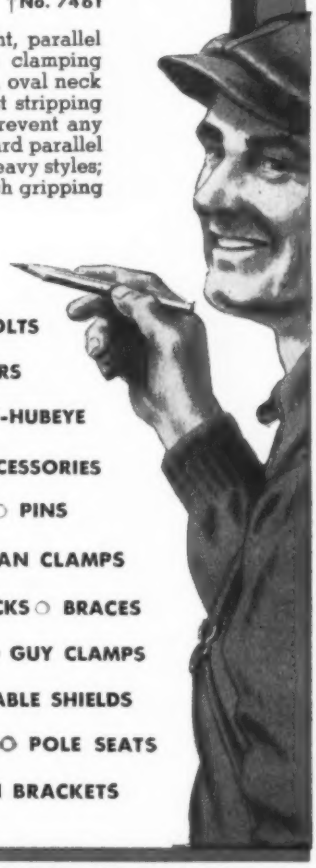
Cutaway view shows the increased contact area between clamp and strand which is afforded by Hubbard Parallel Groove Guy Clamps.



†No. 7461

The Hubbard No. 7461 Guy Clamp, with the straight, parallel groove principle, affords a uniform, non-buckling clamping area in contact with the strand. Special, high carbon, oval neck clamp bolts hold securely while tightening and resist stripping or elongation. Groove ends are slightly belled to prevent any possibility of the clamp cutting into the strand. Hubbard parallel groove Guy Clamps are made in light, medium and heavy styles; each accommodating a variety of strand sizes and each gripping the strand with the Hubbard Grip of Security.

†AT&T CO. STANDARD



ALSO— HUBEYE NUTS ○ HUBEYE BOLTS ANCHORS, PLATE AND SCREW ○ MANHOLE LADDERS BRACKETS, POLE, CORNER AND HOUSE ○ EYE BOLTS-HUBEYE CARRIAGE BOLTS ○ CROSS ARM BOLTS ○ GUYING ACCESSORIES CABLE SUSPENSION HARDWARE ○ POLE BALCONIES ○ PINS STORM GUY ATTACHMENTS ○ SIDE-WALK GUYS ○ SPAN CLAMPS LAG SCREWS ○ MESSENGER DEAD ENDS ○ CABLE RACKS ○ BRACES DRIVE HOOKS ○ EXTENSION ARMS ○ POLE STRUTS ○ GUY CLAMPS POLE STEPS ○ STUBBING BANDS ○ STRAIN PLATES ○ CABLE SHIELDS GUY PROTECTORS ○ GUY HOOKS ○ MACHINE BOLTS ○ POLE SEATS GRADE CLAMPS ○ GROUND RODS ○ TRANSPOSITION BRACKETS

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HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH CHICAGO

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FOR SALE

FOR SALE: Two small town exchanges serving 280 stations including some switch stations; 225 belonging to the exchange and more can be added. Large town is very neat, prosperous and growing. Gross income over $6,000. Write Wikstrom Telephone Exchange, Karlstad and Strandquist, Minn.

FOR SALE: Magneto exchange 163 station owned 150 switched, located in central Minnesota. Company owned building with living quarters and new garage and store-room. 93 telephones with C. B. kick coils. Other business interest. Gross over $7,200. Write Brooten Telephone Exchange, Brooten, Minn.

Telephone fuses repaired — most all types. Heat coils reset and tested. Save up to 50 per cent.

TELEPHONE REPAIR SERVICE
BOX 342
WILLIAMSPORT, PENNA.

FOR SALE: Generous line clearance service at flat mileage rates to specification. Minor maintenance repairs on request. Rural goodwill expertly promoted. American Tree Craft, 607 Catherine St., Ann Arbor, Mich.

FOR SALE: 150 station rural magneto exchange between Hungry Horse Dam and Flathead Lake, Montana. Priced reasonable for quick sale. Write George W. O'Connell, Creston, Montana.

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SURPLUS EQUIPMENT

ORDERS OVER $100 FREIGHT PREPAID

3,000 Leather Tool Belts.....$3.00 ea.
3,000 Leather Safety Straps.....$3.00 ea.
3,000 Buckingham Pole Climbers (Less Straps and Pads.....$2.00 pr.
5,000 #LC-25A Linemen's Leg Wrenches (Equal to Klein's #3146).....$1.25 ea.
3,000 Klein #132-15 Splicing Clamps....$3.25 ea.

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WESTERN HDWE. AND TOOL CO.
97—9th ST., SAN FRANCISCO 3, CALIF.

FOR SALE: Special prices. Immediate shipment. Pole brackets, oak, preservative treated. Wire, new, neoprene, weatherproof, etc. Request details. Write Elfvin Trading, Flemington, N. J.

FOR SALE: Samples upon request. 8000 transposition brackets one point Hubbard 9275—PF-67 or equal, $5.00 per box of 20. 2000 cable wrapping cloths approximately 24 by 38 ins., $1.50 per carton of six. Micopress bronze splicing sleeves No. 3-045B—¾ in. long—$2.50 per box of 250. Write Hadfield Bldrs. Supply, Rt. 5, Box 953, Kent, Wash.

CABLE SPLICING

We are now able to give you advance dates to do your cable splicing and repairing. Wilton Electric and Telephone Contracting Co., Andy H. Mueller, Prop., Telephone 21 Wilton Junction, Iowa.

RECONDITIONED

OPERATOR CHAIRS

28" HEIGHT

ALL WOOD CONSTRUCTION

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BUCKEYE TELEPHONE and SUPPLY COMPANY

COLUMBUS 6, OHIO

FOR SALE

400 Roller Cable Blocks, list $9.50, our price in lots of six packed in box.—NEW $2.75.

Distributor for:
Jaques Earth Boring Machines, Marmon-Herrington All-Wheel Drive Trucks, Poles, Cross Arms, Pole Line Hardware, and Contractors' Equipment.

WYOMING VALLEY EQUIPMENT CO.
1089 Wyoming Ave., Forty Fort, Wilkes-Barre, Pa.

TELEPHONE WIRE

While it lasts W-110B 2 conductor, twisted, 3 copper and 4 steel strands, tinned, insulated, half mile and mile steel reels. $10.00 per mile FOB Ogden, Utah.

SPIRAL 4 CABLE

2500 reels, 1300 ft. each, steel reel 4 conductor, No. 18 all copper stranded wire, rubber insulated, flexible steel mesh in tough neoprene cover. With or without loading coils. New, but stored in open. $10.00 per reel FOB Ogden, Utah.

HARRY P. MARCUS
Amco Brass & Steel Supply Co.
428 Broome St., New York City
Telephone—Canal 61175

— or —

R. O. PEARCE
2185 So. 21 East Street
Salt Lake City, Utah
Telephone—65512

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Completely Rebuilt and Refinished

We rebuild Generators, Receivers and Ringers. We maintain a complete telephone repair service. Workmanship guaranteed.

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Rebuilt Kellogg Transmitters..... 1.65
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Miscellaneous: 3, 4, 5 Bar Generators * * New Oak Wall Cabinets and Ringer Boxes * * Write for prices on your needs.

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